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Department
for Environment
Food & Rural Affairs

Post-Installation Effectiveness of Property Level Flood Protection

Final report FD2668

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A report on research carried out by JBA Consulting, on behalf of the Department for Environment, Farming and Rural Affairs

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Executive Summary

Property-level protection (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 are providing peace of mind and helping to reduce the stress and damage that flooding causes.

The Property Level Protection market has developed significantly in response to the Defra and Environment Agency grant schemes between 2009 and 2012. The importance of independent flood risk property surveys by competent professionals has been highlighted and excellent products are now available, with manufacturers responding with innovative solutions to challenging problems.

However the review of the Defra grant scheme in 2011 noted that systems had not yet been widely tested in flood conditions. Additionally, there were concerns over long-term product storage and maintenance, and levels of emergency planning and readiness. The extensive flooding witnessed during 2012 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 have therefore been contacted in order to gather evidence of how these measures have performed during the 2012 floods. This has included local authority and Environment Agency scheme managers and promoters; Water Company scheme managers and promoters; property flood risk surveyors; product manufacturers and installers, both individually and collectively via the Flood Protection Association; the National Flood Forum; and homeowners and community groups.

This report presents the findings from this engagement, including results from online questionnaires, interviews and meetings. Evidence and views on both scheme performance and thoughts on best practice in Property Level Protection delivery have been collected. An initially slow and modest response however resulted in an extension of time for the data collection phase. This has been supplemented by investigation findings and experiences of residents with Property Level Protection measures in Chew Magna during the 2012 floods; experiences and investigation findings into the 2007 “Making Space for Water” Defra pilot scheme in Appleby; and best practice examples such as seen in Buckingham and South Zeal.

The responses received from local authorities and the Environment Agency reveal that in general, where Property Level Protection measures have been deployed and actually required during a flood, measures have performed as intended and have successfully mitigated against the effects of the flooding in 84% of properties. This highlights how

Property Level Protection can provide communities previously without any flood alleviation options with cost-effective and easy to operate measures to mitigate flood risk.

The review has also identified a wide range of problems and issues that have been recorded relating to the flood protection products, their installation, operation, maintenance and storage; and in some instances the expectations, awareness and understanding of the residents involved. These issues have adversely affected the performance of the scheme and properties have suffered flood damage as a consequence. This has also had a de-motivating effect on the residents involved who have lost confidence in their measures.

These problems have been examined in more detail and recommendations are made to share best practice through simple step-by-step guidance. The examples of where Property Level Protection has been successful, such as seen in Appleby, serve to illustrate what can be achieved by fully engaged communities with a comprehensive package of Property Level Protection measures, with operational details described in effective emergency response plans, supported by regular flood group meetings and integrated multi-agency working. The best practice guidance aims to build on these examples and provide evidence that should encourage other flood risk communities to take such effective action themselves

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Abbreviations

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

Introduction

Terms of reference

Options for managing flood risk include the need to improve the resilience of communities prone to flooding. Flood awareness campaigns are a vital component but in isolation may serve to increase fears of flooding and not increase levels of preparedness. Property-level protection schemes provide cost-effective and easy-to-implement tools for homeowners to take effective action to manage their flood risk. Such measures extend the options for managing flood risk and help bring local communities together to engage and better manage their flood risk.

More than 2,000 homes in over 100 communities have received flood protection measures as part of schemes funded by Government and the Environment Agency. However, in 2011 it was noted that systems had not yet been widely tested in flood conditions. Additionally, there were concerns over long-term product storage and maintenance, and levels of emergency planning and readiness.

Extensive flooding in 2012 has now tested many of these Property Level Protection schemes. Therefore, Defra commissioned JBA Consulting to undertake a systematic evaluation of the effectiveness of Property Level Protection schemes, funded between 2007 and 2012, under flood conditions. Furthermore, the study was intended to gather the best practice emerging in the industry, and compile to form a 'Property Level Protection Handbook' for scheme managers and promoters in the future.

Aims of study

The need for this study into the post-installation effectiveness of Property Level Protection is to document the performance of schemes, particularly (but not solely) during the floods experienced during 2012. It is understood that in some instances the package of Property Level Protection measures ensured that the damages caused by flooding were reduced, whereas elsewhere, especially in one high profile instance in the village of Chew Magna in Somerset, a variety of factors meant that they did not work as well as had been hoped. The aim of this study is to review schemes and to draw out lessons learnt and case studies of best practice lessons from what has happened with these since installation.

This report sets out the data gathering process used to inform the study, identifies the range of stakeholders engaged and factually reports the findings and responses received. It then draws out those experiences from across the industry to inform best practice guidance. It is hoped this evaluation will ensure that experiences are shared and help to consolidate Property Level Protection approaches, enabling Property Level Protection to be an ever more effective, robust and long-term option for managing local flood risk.

Report structure

This report provides a brief background to the development of property level protection and identifies the stakeholders who participated in the research, such as risk management authorities, property flood risk surveyors, product manufacturers, the National Flood Forum and homeowners. It collates and summarises the responses from those interviewed, both on scheme performance and thoughts on best practice. The report has been structured into the four stages of Property Level Protection: appraisal; selection; installation and handover; and product performance and aftercare. The best practice guidance has been compiled from the many thoughts and suggestions from across the sector, together with direct survey and scheme experience.

Background

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).

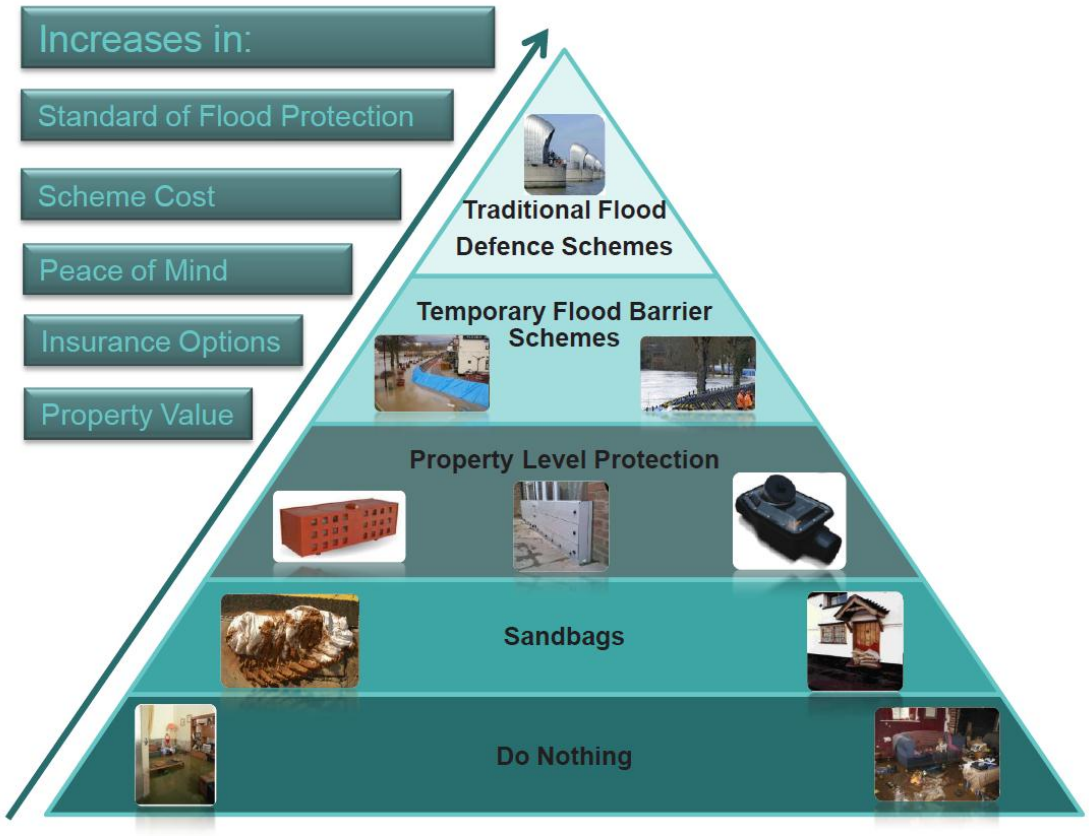


Figure 1 Hierarchy of Flood Protection

Following the extensive damage and distress caused by the 2007 summer floods in England, Defra commissioned research to assess why there was not greater uptake and use of individual property-level flood protection measures. A range of products

had been tested and shown to be effective and widely available since the introduction of the British Standards Institute (BSI) Kite-mark scheme in 2003. However, subsequent flood events revealed that many property owners and operating authorities continued to rely on the largely ineffective sandbag.

As a result of this research, Defra announced a £5 million Property-level Flood Protection Grant Scheme in December 2008, to be implemented in two phases over the following two years. By the close of the 2 year programme in March 2011, over £5.2 million had been awarded to 63 individual Property Level Protection schemes, offering practical flood protection solutions using a variety of flood barriers, non-return valves and airbrick covers or replacements for around 1,100 properties.

The location and distribution of all the Property Level Protection schemes is illustrated in below.

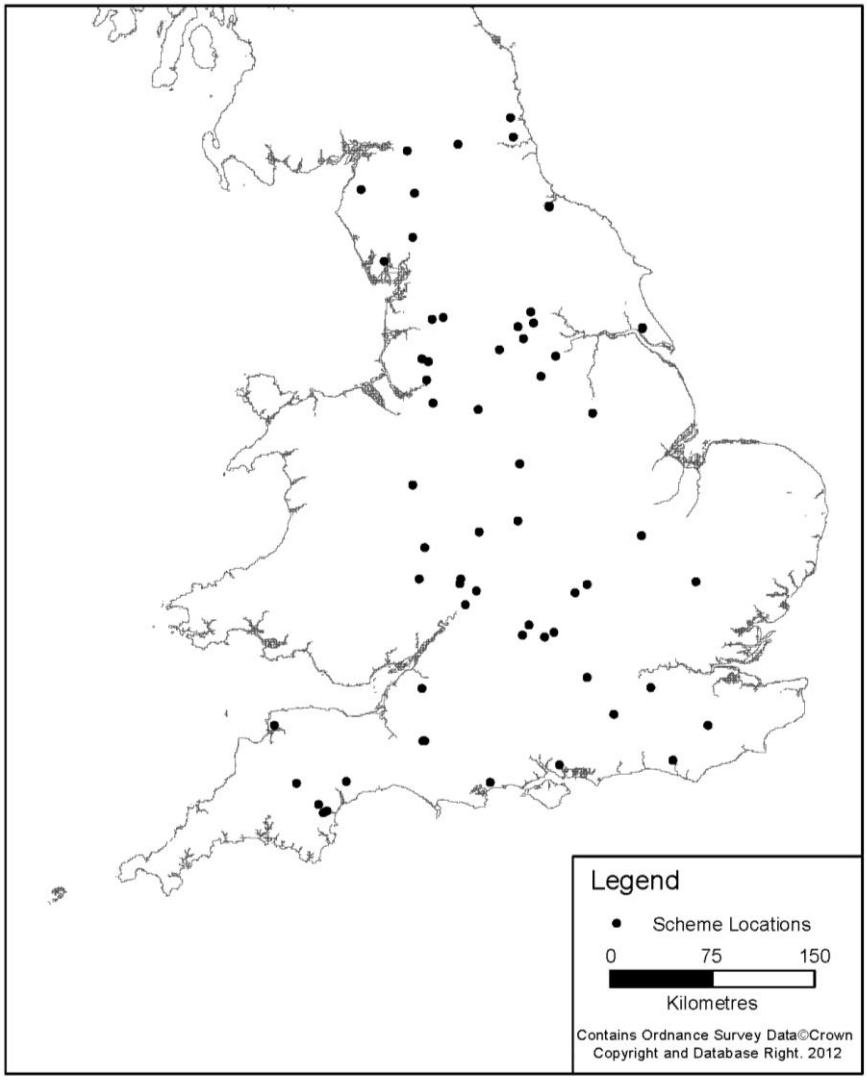


Figure 2 Distribution Map of all 63 Defra Property Level Protection Schemes

Property Level Protection Evaluation Report

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 over 80 stakeholders including local authorities, flood product manufacturers, Environment Agency staff and survey companies.**
- **56 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. To simplify this complex process, evidence was collected and analysed in four distinct categories representing the stages of Property Level Protection scheme delivery:

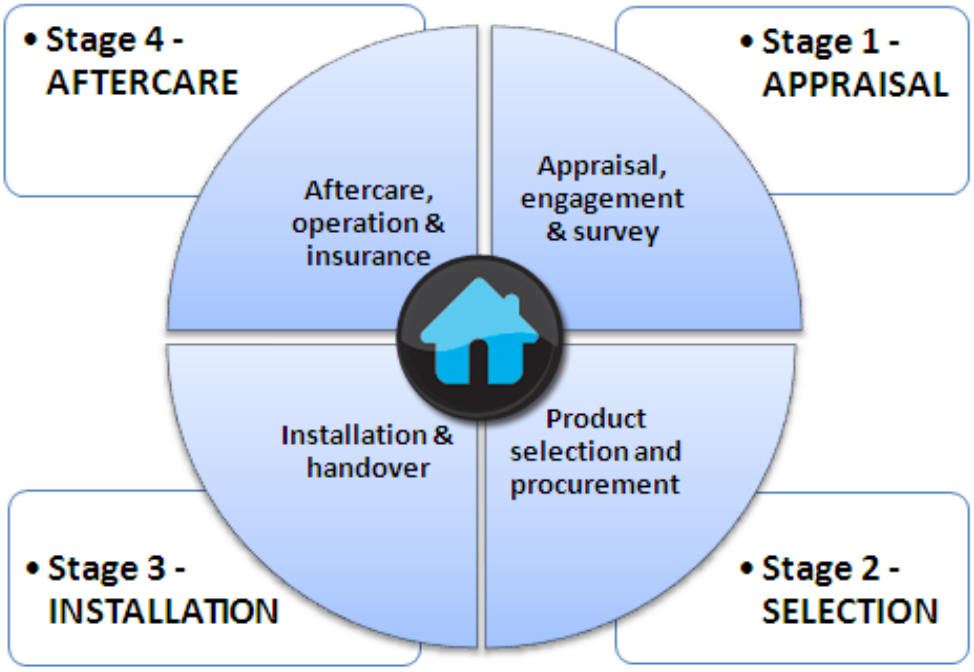


Figure 3 Four Staged Approach to Property Level Protection Evaluation

The evaluation found that awareness of Property Level Protection measures amongst residents before the Defra Grant Scheme was low. Effective community

engagement was therefore the key to successful delivery of local schemes. The level of participation in schemes was high, with over 90% of residents taking up the flood products offered, although few residents contributed to the funding themselves. Several residents stated that a more positive response from insurers, recognising flood protection measures in providing insurance and setting premiums and excesses, may help to motivate and increase uptake amongst homeowners. Figure 4 identifies the key findings of the Evaluation Report.

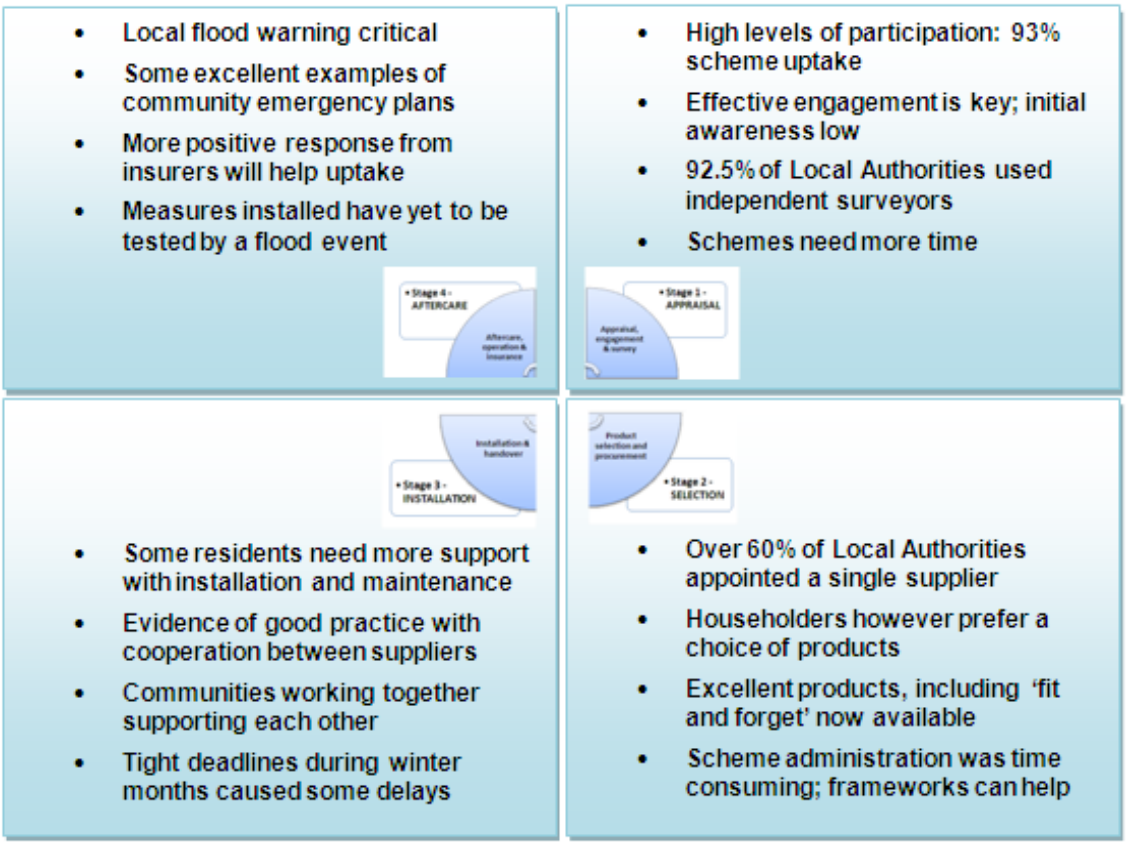


Figure 4 Findings from Defra Property Level Protection Grant Evaluation Report

An Action Plan was also prepared by Defra and the Environment Agency to ensure that the recommendations from this evaluation were enacted. This identified a series of actions for various stakeholders and was intended to ensure the momentum gained from the Defra Grant Scheme was maintained.

Overall, the Defra Property Level Flood Protection Grant Scheme was very successful in meeting its original objectives however none of the schemes had been tested during a flood event and as such, data on product performance was limited. Extensive flooding in 2012 has since tested many of these schemes and this report collates and evaluates scheme and product performance, whilst serving to capture the best practice emerging from this relatively young (but maturing) industry.

Methodology

Stakeholders

A range of stakeholders involved in the planning, delivery and operation of Property Level Protection schemes were contacted in order to gather evidence of how Property Level Protection measures had performed during the widespread flooding experienced during 2012. This included:

- Local authority (LA) scheme managers and promoters;
- Environment Agency (EA) scheme managers and promoters;
- Water Company scheme managers and promoters;

Property flood risk surveyors and product manufacturers and installers, approached individually and via the Flood Protection Association (FPA);

- The National Flood Forum (NFF); and
- Homeowners and community groups.

The findings from this engagement, including online questionnaires, interviews and meetings are presented and discussed below. Evidence and views on both scheme performance and thoughts on best practice in Property Level Protection delivery have been collected. An initially slow and modest response resulted in an extension of time for the data collection phase. This has been supplemented by the investigation findings and experiences of residents with Property Level Protection measures in Chew Magna during the 2012 floods; and the experiences and investigation findings into the 2007 “Making Space for Water” Defra pilot scheme in Appleby.

Approach

Online questionnaire

Given the numerous scheme managers and promoters within LA’s and the EA it was important to adopt the most efficient means of communication possible. An online questionnaire was developed (via Survey Monkey) to guide LA and EA respondents through a suite of questions intended to capture whether the scheme had been tested during flood conditions.

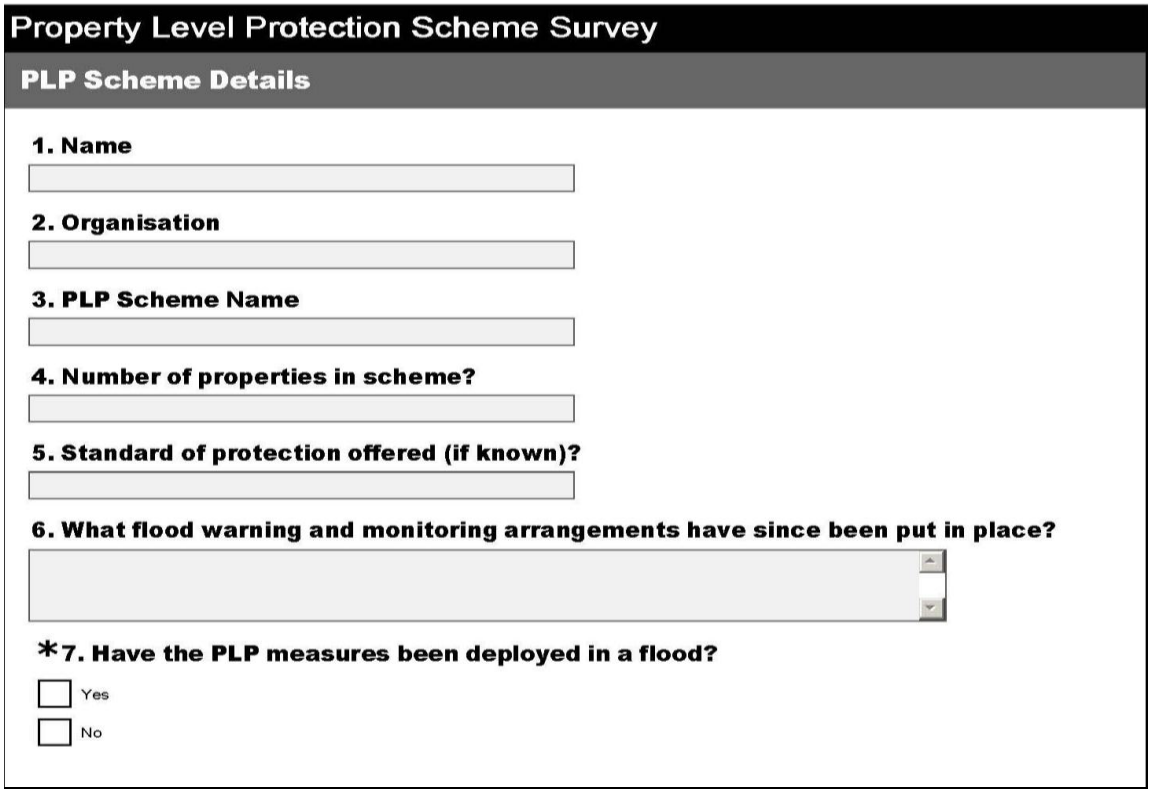


Figure 5 Online Questionnaire Screenshot 1

In cases where the Property Level Protection scheme was identified to have been tested in flood conditions, the respondent was asked to expand on the impact of the flooding, and how effective the measures had been. The option was given to enter a maximum of 5 separate flood events; however none of the respondents used this option. An important distinction is made when considering how “success” is defined: schemes may well have kept all floodwater out of the property and proved highly effective; however an additional category (see Q9 in Figure 6) also records schemes where the measures were deployed and helped limit the ingress of floodwater, thereby reducing the impacts and damage caused by flooding.

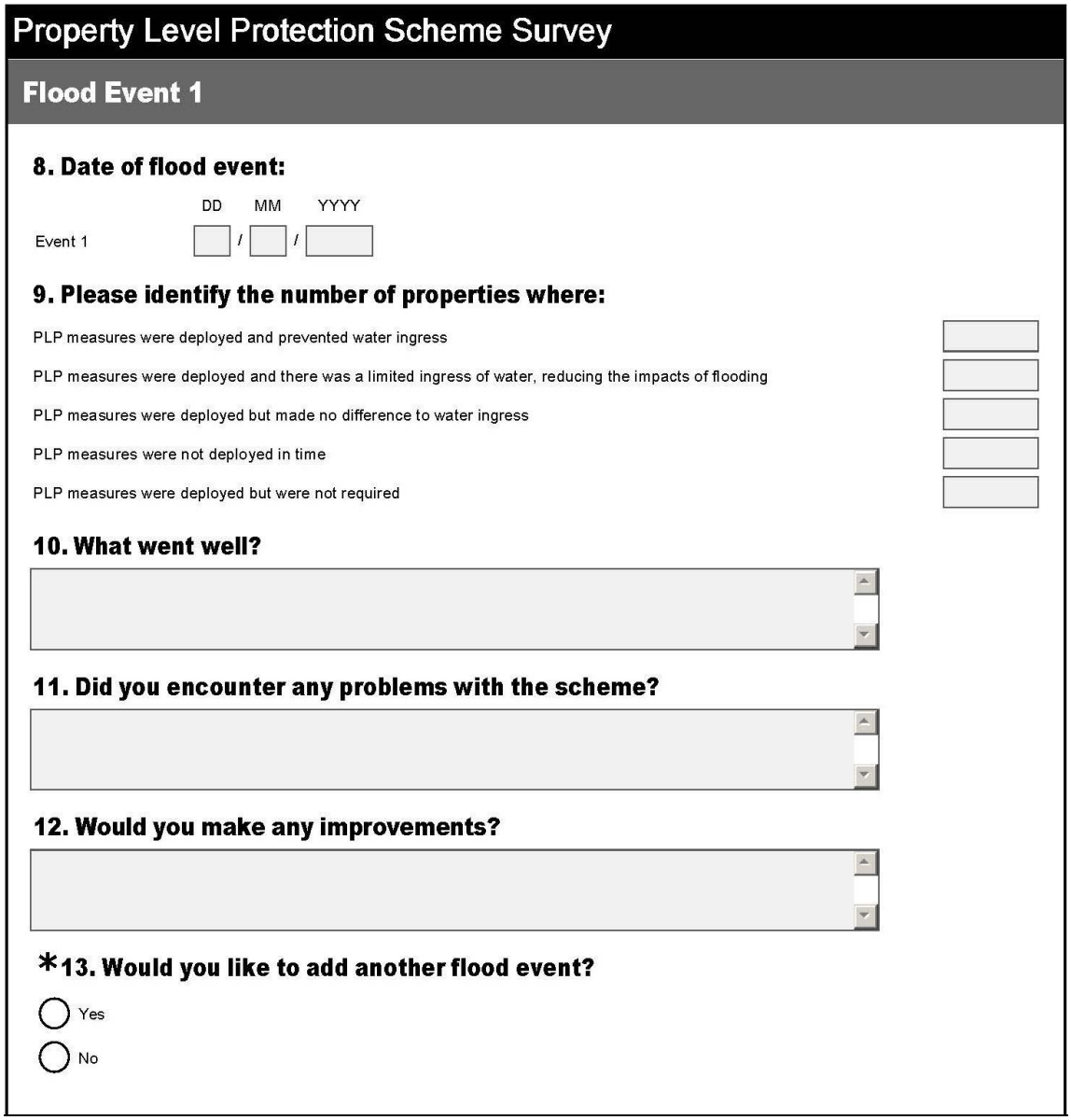


Figure 6 Online Questionnaire Screenshot 2

Telephone interviews and meetings

Further to the online surveys, a telephone interview was conducted with each LA and EA respondent to enable further explanation of responses and to draw out additional information. A template was used to help guide the conversation and ensure consistency, whilst allowing the respondent to openly air their views, opinions and feedback. A sample of this template is provided in Appendix B.

Telephone interviews were also conducted with other stakeholders, who were not reporting on scheme performance using the web-based questionnaire. These included the National Flood Forum, product suppliers and the Flood Protection Association (FPA) and installers, as well as homeowners and known members of community groups. Where appropriate, telephone calls were followed up by emails and often more detailed responses obtained via email from the various stakeholders.

A number of meetings were held to further capture valuable data from particular stakeholders. This included a workshop with representatives from four water companies (United Utilities, Northumbrian Water, Severn Trent, and Thames Water) and also a discussion and presentation of the research project at an FPA meeting.

Desk study

In conjunction with the data collected as part of this post-installation review, data from previous studies such as the 2011 Defra Grant Scheme Evaluation report was incorporated and reviewed.

Evaluation Findings:

Stage 1 - Appraisal, Engagement and Survey

Appraisal and scheme management

Many of those interviewed commented on the need for Property Level Protection to address all sources of flooding, with a package of measures addressing risk 'in the whole'. This corresponds with the recommendations of the Pitt Review, suggesting the need for a more integrated approach to flood risk management. Experience from those who have delivered Property Level Protection schemes demonstrates that homeowners just want solutions, without the "it's not our water" response. There have been numerous examples of Property Level Protection schemes where outcome measures, influenced by the responsibility of the risk management authority, have determined the package of measures on offer. However Property Level Protection schemes that provide a complete package of measures have been shown to be most effective, having considered and addressed all sources of flooding; these will have considered fluvial, surface water, foul and groundwater (or indeed the risk of rising water through the ground due to saturated conditions) in an integrated manner.

"One property was flooded because a pump that was meant to be supplied was not"
Braunton (North Devon)
Local Authority - Project Manager

"Many of the properties in this scheme suffer from groundwater ingress. Even though some of the properties still flooded badly, the homeowners reported the Property Level Protection measures greatly reduced flooding and were very pleased they had them!"
South Derbyshire - Local Authority Project Manager

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 must be **clear and transparent**. For example, the water industry suggested that once a risk is identified, all properties should be appraised for suitability, rather than addressing it on an ad-hoc basis. Further information from local field-based teams is also fed into the appraisal process.

The National Flood Forum commented that Property Level Protection should not be seen as the cheapest and quickest solution for a community, but that the traditional appraisal using the hierarchy of flood mitigation measures should be undertaken. The pre-scheme appraisal should identify whether Property Level Protection is considered suitable for the property, area and resident's circumstances, to identify whether there is any other viable alternative which could be adopted. Furthermore, conversations need to be commenced with communities as to whether a Property

Level Protection scheme will impact their future eligibility for alternative measures or can be regarded as an effective “stop-gap” while other solutions are investigated.

> “Securing funding can be time consuming. I feel that in cases where there is a justified need, funding should be fast tracked, and where residents are on a low income, schemes should be fully funded.”
>
> *South Zeal, Okehampton*
> *Local Authority Project Manager*

The perception from product suppliers is that often timescales for appraisal, engagement and flood risk survey have been too tight, and that realistic timeframe in the wider delivery programme also needs to be considered for product manufacturing lead times (often 2-4 weeks).

Responses from flood risk surveyors and product suppliers demonstrated the need for scheme managers and promoters to better understand the administrative requirements around successful scheme delivery; participation / legal agreements and programming.

Engagement

Without exception, feedback from all stakeholders confirmed that **early and ongoing engagement** is imperative to successful scheme delivery, and this should commence as soon as the risk is identified. Findings from the 2011 Property Level Protection Grant Scheme Evaluation identified that resident’s awareness of Property Level Protection pre-scheme was varied, with most unaware of the products available. This demonstrates the importance of effective engagement being based around education; informing homeowners of the risks they face (from all sources), and educating them in what can be done to better protect themselves and their property.

> “It is difficult to seal old properties where water comes through walls or properties. Despite this, the residents still noticed a reduction in ingress and their confidence in the Property Level Protection measures rose”
>
> *Alconbury and Alconbury Weston*
> *Local Authority Project Manager*

Community engagement is made easier when coordinated through a Flood Group, providing a forum for discussion and ensuring the effective ongoing management and aftercare of the scheme through dovetailing with local emergency plans, nominated flood wardens etc. A motivated and proactive community Flood Group leader will help to build trust locally.

The National Flood Forum explained how early engagement should enable homeowners to understand the **range** of products on the market (e.g. what they look and feel like). This exhibition should be organised by the scheme promoter, to initially explain the purpose of the scheme. The independent property flood risk

surveyor should be in attendance, so that homeowners can gain an understanding of the process and what is to be provided.

Figure 7 National Flood Forum Flood Information Trailer

Furthermore, a need for the residents to see the products again once the property flood risk surveys have been completed was identified by the National Flood Forum. This second exhibition will allow the residents to discuss the survey findings with the surveyor in a more informed manner.

The water industry is shown to be particularly keen to remove all technical terminology from any correspondence. Plain English is used, defined to be understood by the ‘intelligent 12 year old’. Furthermore, the terminology used is considered by all those interviewed to be significant, with the need for a **standardized glossary of terms.** For example, the perception from the water industry is that phrases such as 'mitigation' or 'protection' artificially raise expectations, and instead opt for 'risk reduction' rather than flood prevention. The following naming suggestions have been made:

- Property-level flood protection
- Property flood alleviation
- Property flood risk reduction
- Property flood mitigation

A glossary of terms is provided in Appendix A.

Survey

One of the recommendations from the 2011 Property Level Protection Grant Scheme Evaluation was for the need to ensure **independence** of the surveyor from the installer and / or product supplier. During the Grant scheme, 37 of the 40 Local Authorities contracted an external survey company, with independence from the suppliers which is seen as vital. This approach is also adopted within the water industry, avoiding the possibility of suppliers promoting their own product range which is not necessarily suited to the homeowner or property. Amongst the many respondents who commented on the need for independence, the National Flood Forum identified how this is the only mechanism to ensure the appropriate suitability of a product for the end user is considered.

The National Flood Forum commented that the surveyor should engage effectively with the homeowner, creating a productive relationship which will facilitate the entire Property Level Protection process.

> "The surveys were carried out well and I was kept informed as to when they would turn up. During the survey stage I was invited to a few meetings arranged by the Environment Agency, and they had all the equipment and information needed. I was kept informed what would be installed and how!"
>
> *Bin Brook, Cambridge*
> *Property owner*

Many of the product manufacturers interviewed commented on the deliverables supplied by the property surveyor. For example, some commented on reports which are either very large, containing much surplus background information which is not necessarily relevant to the individual property. Furthermore, all manufacturers / suppliers commented on the need for them to receive a clear and complete Bill of Quantities as part of the tender process, completed by the surveyor. This should include a list of all recommendations at each property, and specify exact requirements (such as push-fit or full-port non-return valves, pumping requirements etc.), including additional items such as re-pointing, and wider considerations for the tender process such as manufacturing survey, customer handover training and the need for a welfare unit.

Whilst product integrity and quality is recognised through the BSI Kite-mark scheme, the competence of property flood risk surveyors was something which many product suppliers, and the FPA, commented on. There is no formally recognised qualification, national training or approved standard, and although many surveyors promote RICS (Royal Institute of Chartered Surveyors) accreditations, this is not considered by many interviewed, such as the National Flood Forum and the Environment Agency, to be relevant as flood risk assessment is a prime requirement. Training and accreditation is key to gaining trust of homeowners and scheme promoters, and will enable consistency across the industry. The perception from the Environment Agency was that a recognised 'Customer Service' qualification should also be pursued.

Evaluation Findings: Stage 2 - Selection

Appointment of surveyors and suppliers

Key findings from the 2011 Property Level Protection Grant Scheme Evaluation report identified that procurement was affected by resource issues and tight timescales, with Local Authority procurement issues sometimes causing problems and delays. This has since been borne out in local authority procurement, adopting the Government Procurement Service framework.

The Environment Agency have a Flood Resistance Measures framework in place, for procurement of both surveying and product supply services. Due for renewal in 2014, the framework is managed by Midlands region, but has been used nationally. The perception from scheme managers is that framework agreements are a necessity to reduce the administrative burden. However, the dynamic nature of product innovation means that often new products are not offered / available from incumbent framework suppliers. The EA commented that the renewed framework must seek to make best use of the latest innovations from non-framework suppliers without breaking public procurement legislation. The use of only approved framework suppliers will also help towards eliminating poor workmanship, and in the water industry the stipulation is made that sub-contractors must not be used.

Many product suppliers and surveyors have commented that tender material from local authorities often varies dramatically, and often seek information more suited to pre-qualification stage rather than bid stage. Furthermore, some Councils' are shown to favour online portals, whereas others adopt standard tender proforma. The comments from those in scheme delivery (surveyors and suppliers) were that a consistent framework should be available nationally, to all risk management authorities. This will ensure consistency in tendering, provide the homeowner with confidence over standards and improve scheme efficiency.

It has been identified that as Property Level Protection becomes more widely adopted by all risk management authorities, more standardisation is needed in the tendering phase, not just in the tender documents and level of detail required, but also in cost-quality ratios.

> "Often the weighting on tenders is 30% quality and 70% cost...which is not in the long term interest of the industry as a whole, attempting to increase standards and demonstrate the efficacy of Property Level Protection as a mitigation tool. It would be more desirable to have a standard 50-50, where price is not favoured over quality of product and delivery"
>
> *UK Flood Barriers*

Product selection

Those interviewed from the water industry all commented on how the most suitable product is sought, and any associated higher costs are not a hindrance to installation and procurement. This mature approach to risk assessment aims to satisfy homeowner needs and often sees passive measures, including flood doors, favoured over manual barriers. **"Passive measures, suitable for all"** was a particular noteworthy phrase. Furthermore, attempts are made to identify and address any local increase (or perceptions) of risk to other nearby properties (albeit often negligible).

The suitability of the product for the homeowner is something which particularly resonates with surveyors, product manufacturers and the National Flood Forum, with the perception that often scheme managers do not place enough importance on this at tender stage. The package must be manageable for the homeowner and their circumstance. Considerations must be made of flood warning availability, and listed or conservation areas status restrictions. However, installers are mindful of liability with respect to the installation of another company's product, additional unknown prices and delays in manufacture out of their control. The manufacturing and installing industry, through the vehicle of the Flood Protection Association, are encouraging greater partnership, cooperation and mutual agreement on this issue.

"It was difficult enough to find door barriers that fitted and worked for the properties that people like aesthetically, without factoring in the ability of the residents to deploy the measures. Subsequently, elderly residents often had Floodgate barriers installed which are too heavy for them to fit alone."

South Derbyshire
Local Authority Project Manager

"It is very hard to take account of the ability of the homeowner to set up defences in rented properties, where there is often a high turnover of residents...The measures installed in this scheme worked well"

South Derbyshire
Local Authority Project Manager

Evaluation findings: Stage 3 - Installation & Handover

Installation and sign-off

Evidence suggests that the quality of installation works (and subsequent independent inspections and sign-off) is in many regards the most critical element of the process. Examples are emerging which demonstrate receiving barrier rails not being adequately sealed to prevent water seepage, barriers resting on flexible uPVC or rotten timber thresholds, and barrier fixings (tappings etc.) becoming degraded over time. Whilst there is a clear link with product maintenance, the quality of workmanship and decisions regarding installation remains clear.

> "The installation was completed in 2 days; the contractor showed us what he was doing, and then gave on the spot training"
>
> *Bin Brook, Cambridge*
> *Property owner*
>
> "One property was not able to deploy their Property Level Protection measures because they were new to the area and had just had new windows and doors fitted. They were unaware of what the Property Level Protection measures were"
>
> *Fillongley*
> *Local Authority Project Manager*

It is evident from those interviewed that the installation process should facilitate the aftercare, operation and ongoing ownership of the product. For example, whilst it is commonplace for flood barriers to be identified with the correct aperture, the water industry is beginning to consider identifying flood doors as such. This is to demonstrate to the emergency services that it is a flood door, and that alternative access or emergency rescue considerations would be needed.

> "Some of the measures were damaged due to poor maintenance or storage. Some seals had perished and the residents were not confident in the measures – they asked for sandbags up against the Property Level Protection."
>
> *Girton Village (Nottinghamshire)*
> *Local Authority Project Manager*

All of the stakeholders approached confirmed the **benefits of wet-testing** as part of the product installation and handover process. The handover goes beyond the provision of a training manual, but is seen as an integral part of the education process. The process demonstrates to the homeowner that the product is watertight, thereby ensuring confidence in the Property Level Protection package provided, and provides a valuable opportunity for the installer to train the resident in deployment. It is requested from product installers that this is reflected in the Bill of Quantities provided by surveyors, and issued as part of the tender package.

Figure 8 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

"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

The trials were therefore particularly useful to raise awareness and knowledge of how to install the defences. In Alconbury and Alconbury Weston it was reported that such a 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. Again, increased use of automatic measures, (greater) public buy-in, and more active flood groups were suggested as possible solutions.

Evaluation Findings: Stage 4 Product Performance and Aftercare

Online questionnaire responses

Emails were sent to all local authority and Environment Agency officers who were known to have been involved in Property Level Protection schemes, inviting then to complete the online questionnaire. This came to a total of 66 Environment Agency schemes and 70 local authorities. Where recipients were identified to have worked on a number of schemes, they were asked to fill in a separate questionnaire for each. Where both EA and LA officers were identified to work on a project, both parties were asked to respond to ensure that a full account of the scheme could be ascertained.

Responses were received for 6 of the 66 EA schemes (9%) and 27 of the Local Authority schemes (39%). To encourage a wider response from stakeholders the deadline was extended by a further month. A further 4 additional schemes were reported on by both Local Authorities and EA representatives, increasing the total response rate to 17% for EA and 44% for LA.

	Environment Agency	Local Authorities
Survey Invites:	66 schemes	70 schemes
Invite Responses:	6 schemes	27 schemes
Response Rate:	9%	39%
Additional Responses:	5 schemes	4 schemes
Total Responses:	11 schemes	31 schemes
Total Response Rate:	17%	44%

Table 1 Online Response Summary

Environment Agency Response Analysis

The data provided through the online questionnaire identified that to date 6 out of the 11 schemes had deployed their Property Level Protection defences. This equates to a total of 115 properties that have tested their measures during a potential or real flood event, and 38 that have not. From the 6 respondents to identify that Property Level Protection measures had been deployed, 4 offered a breakdown (by property) of the effect that the Property Level Protection had upon deployment.

"We have received positive feedback from the district councillor and the local community. The scheme has worked effectively on three occasions since implementation. No properties flooded during these events."

Waddingham, Lincolnshire Environment Agency Project Manager

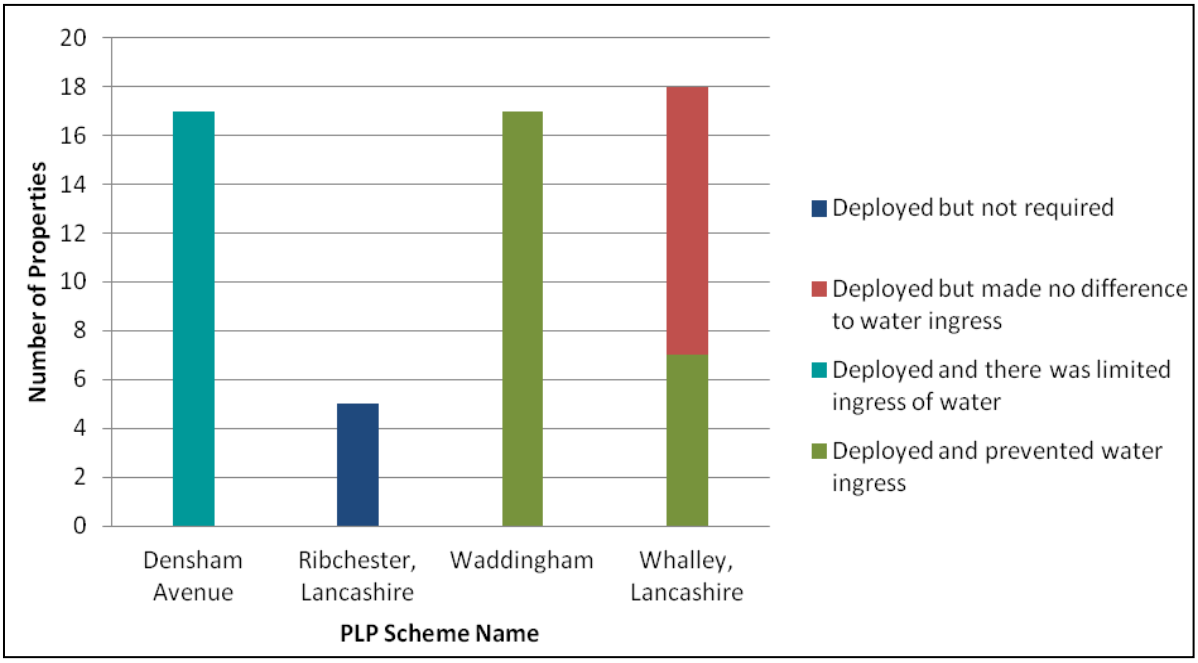


Figure 9: Impact of Property Level Protection Deployment (EA)

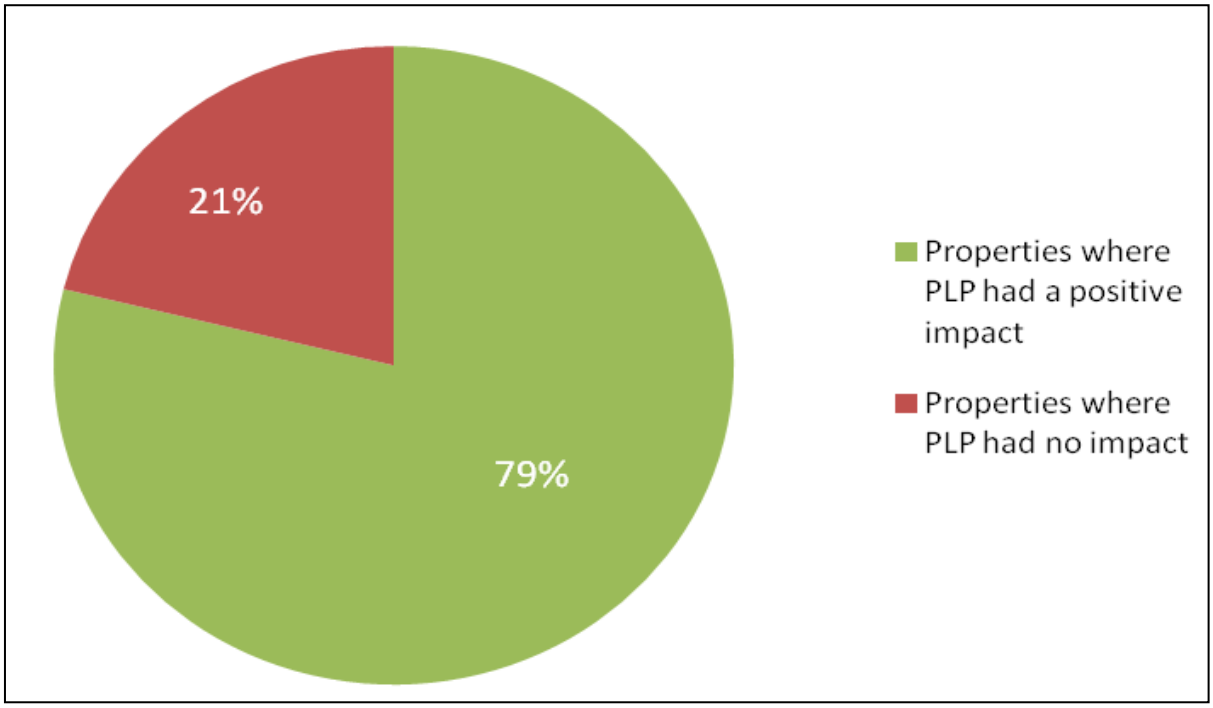


Figure 10 Benefits of Property Level Protection Deployment (Environment Agency)

This data was further scrutinised to demonstrate where Property Level Protection deployment had a positive impact. Properties where Property Level Protection was ‘deployed and prevented water ingress’ and ‘deployed and there was limited ingress of water’ were categorised as 'properties where Property Level Protection had a positive impact'. Properties where Property Level Protection was ‘deployed but made no difference to water ingress’ were categorised as 'properties where Property Level Protection had no impact'. The properties where the Property Level Protection was 'deployed but not required' were removed from this subsequent assessment. In approximately four out of five cases in which Property Level Protection measures have been deployed in Environment Agency schemes they have been reported to have had a positive impact.

Local Authority response analysis

Local authorities identified that 12 out of 31 schemes for which responses had been received had deployed their measures during a potential or actual flood event. This equates to 338 out of 689 properties. Of the 12 schemes to have been tested, further information was provided for seven, which allowed for a more detailed breakdown of performance.

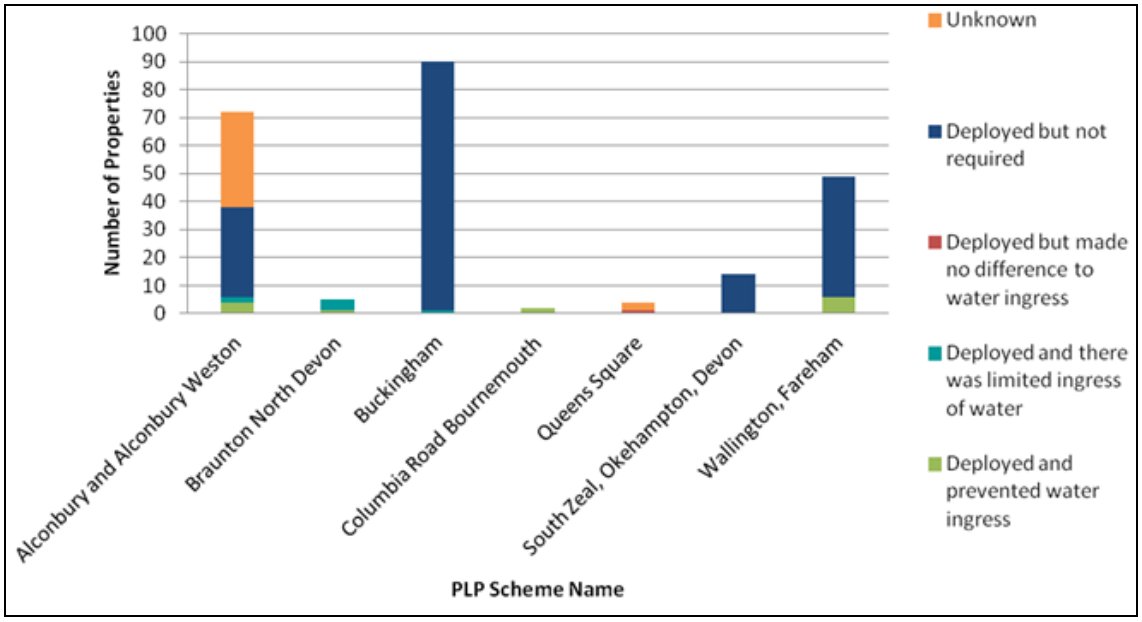


Figure 11 Impact of Property Level Protection Deployment (Local Authority)

A similar assessment has been made of the benefits of deployment as for EA schemes, attempting to demonstrate whether the Property Level Protection measures had a positive impact. In this instance it should however be noted that for a large number of properties, the data was either unknown or the measures were deployed and not required (i.e. the sample of which the following summary is based is very small). It does however suggest that for 19 out of every 20 properties where

Property Level Protection was necessarily deployed, the Property Level Protection measures reduced the impact of the flood event and had a positive impact.

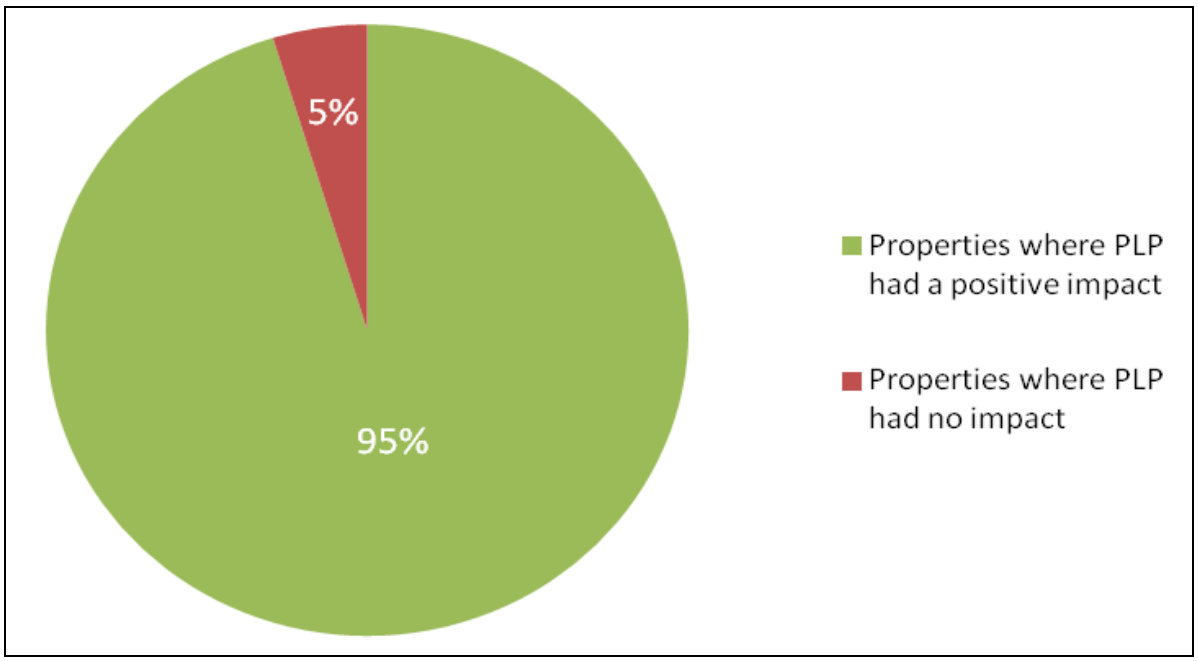


Figure 12 Benefits of Property Level Protection Deployment (Local Authority)

In four of the schemes, a large proportion of the Property Level Protection measures were deployed in flood events but not required. Feedback suggests that this was because the measures were deployed in a minor flood event, and deployment served as a trial for a future larger flood event. Without exception, these trial runs were reported as useful, not least for identifying installation and ongoing storage and maintenance issues. In Fareham:

> "Some people had lost nuts and bolts etc. to fit the barriers. Maintenance of the products was not great, rubber seals were a little weathered in places".

Performance and aftercare feedback

The following is a sample of the feedback on product and scheme performance, and aftercare, from a number of the stakeholders. The local authority project manager from South Derbyshire reported:

> "Despite some properties suffering water ingress via porous floor slab (floor/wall joint failure) nearly all residents reported greater resilience and lesser impact when compared with 2000 floods of similar magnitude. The amount of remedial works reported were less; together with shorter time away from property during clean up. A number of those affected by flooding have reported high confidence in the measures, despite not entirely keeping water out. As the defence measures have shown tangible results many householders have gone on to commission additional works to their homes for the purpose of flood protection".

A property owner from Bin Brook, Cambridge commented:

> "From the [flooding] experience I knew we needed an emergency plan. I have added life jackets, thigh high boots, rope, a generator, head torches, a tool kit and various other items as these are a must".

The benefit of the Property Level Protection measures here are evident:

> "Since that experience we have fitted the flood defences 3 more times which on all occasions have saved the property".

Other feedback includes:

> "Insurance companies need to make allowances for residents/communities who have invested in products to protect their homes"
>
> **South Zeal, Okehampton - Local Authority Project Manager**
>
> "The proceedings to install Property Level Protection are too bureaucratic and not worth the hassle for schemes smaller than around 20 properties"
>
> **Columbia Road, Bournemouth - Local Authority Project Manager**

Evidence would suggest that there has been wider reporting on testing, emergency planning and community flood planning by local authorities than by the Environment Agency. In the water industry, testing of product performance is considered vital to ongoing operations, with annual tests undertaken to verify its fitness for purpose. Furthermore, a maintenance card is provided to each property owner, explaining what they need to do to ensure optimum performance. This practice is undertaken by many installers, with all offering homeowner packs (and some even DVDs). Whilst maintenance agreements and product warranties are vital, one suggestion from a product supplier was that a small component of scheme budget should be set aside for an annual audit and health-check survey of the products (analogous with a MOT service for a car). This visit can also serve to re-train residents how to deploy measures. The National Flood Forum support this view, commenting that thorough training is always needed.

Overview

The majority of submissions received reported that schemes had not been tested. However in cases where they had been deployed and feedback was available, it was generally positive.

Local authorities provided 31 responses, 12 of which confirmed that the Property Level Protection scheme had been tested but further details were only provided for 7 schemes. The local authority response indicates that **for 95% of properties the impact of Property Level Protection measures was positive** as they either prevented or reduced the level of flooding; only 5% of properties found that they made no difference.

Of the 11 Environment Agency responses received, 6 schemes had been tested and Property Level Protection measures deployed but only 4 provided further detail. The information provided showed that **for 79% of properties, Property Level Protection measures either prevented flood water ingress or served to reduce the impact** and level of flooding experienced, whilst 21% found that it made no difference at all.

Overall assessment

- **84% of 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.**
- **However problems have been reported with product installation, operation, maintenance and storage leading to poor performance**
- **These findings highlight the need to capture and share best practice**

These findings highlight how Property Level Protection can provide cost-effective and easy to operate measures to mitigate flood risk for communities previously without any flood alleviation options.

The review has also identified a wide range of problems and issues that have been recorded relating to incomplete packages of measures, problems with the flood protection products, their installation, operation, maintenance and storage; and in some instances the expectations, awareness and understanding of the residents involved. These issues have adversely affected the performance of the scheme and properties have suffered flood damage. This has also had a de-motivating effect on the residents involved who have lost confidence in their measures. Demonstrating the performance successes, which often remain unreported (and hence have been highlighted in this review), is therefore fundamental to ensuring the use of Property Level Protection both maintains momentum and gathers local buy-in as an accepted and trusted form of flood mitigation.

One of the most important messages to come out of the review was the need for product testing and trial runs, ensuring that residents are aware of what they need to do and that they have all necessary equipment to hand. Trial runs are also crucial for identifying ongoing storage and maintenance issues such as worn seals which will of course impact the level of protection offered by the product. As highlighted by the Chew Magna scheme, homeowner expectation is another key point and it should always be stressed that Property Level Protection products will not completely prevent flooding but will help to limit the damage caused.

These problems have been noted and are examined in more detail in Section 9 and addressed by compiling the best practice recommendations for delivery of Property Level Protection

Further Property Level Protection Scheme Feedback

Chew Magna

Background

In May 2010 the village of Chew Magna was selected as one of the 63 sites chosen across England under the Government's two year pilot property-level protection (Property Level Protection) grant scheme. Chew Magna is located in a rapid response catchment with challenging flood management issues but also a great willingness by all parties to explore all possible options to help reduce flood risk in the village, including the innovative use of Property Level Protection. Bath and North East Somerset Council (B&NES) was successful and awarded £325,000 in two phases to provide surveys and individual flood protection measures to a total of 69 properties at significant flood risk in the village. At the time this was the largest of all the pilot schemes, seen as a good example of partnership working between B&NES, the Environment Agency and Chew Magna Parish Council, together with Capita Symonds and UK Flood Barriers, the appointed property surveyor and product supplier respectively.

The scheme was completed in March 2011 but as with all the pilot schemes, the measures were not required or put to the test for over a year, until one of the wettest years on record led to widespread flooding in Chew Magna during September and November 2012. The catchment responds rapidly to rainfall and this was exacerbated by saturated conditions for much of 2012, leading to an excess of surface water on the roads, insufficient drainage capacity to cope with the heavy rainfall and runoff from the agricultural land. Extremely intense rainfall falling on saturated ground led to some of the highest river levels on record, causing widespread property flooding. This was exacerbated by flooding from the smaller tributary ordinary watercourses, from surface water runoff following pathways such as roads and from groundwater. There were, however, no reports of widespread foul sewer flooding.

Performance during 2012 Floods

Despite the implementation of the Property Level Protection scheme in Chew Magna, around half of the 69 properties provided with individual property protection measures suffered varying degrees of flood inundation and damage, leading to anger and concern. Although the Property Level Protection measures helped protect some properties, many residents have expressed their concerns over the scheme and over future flood risk.

An independent investigation has shown that the problems experienced were a combination of factors: particularly severe flooding; a failure to recognise the risk posed by floodwater rising through the floors; the lack of provision of dewatering

pumps to help mitigate this risk; leaking barrier seals reported at some properties; instances of poor product storage and maintenance; and raised expectations of the standards of protection that might be expected from Property Level Protection measures. In particular, the investigation has found:

The extreme conditions experienced during 2012 led to severe, extensive and repeat flooding. Analysis suggests that the flooding witnessed on the Winford Brook during September 2012 had a 1% chance of happening in any given year, to only be expected on average once in 100 years. This rarity of flooding resulted in 13% of the flooded properties experiencing floodwater levels above the top of the barriers and hence exceeded the standards of protection offered.

Although the flooding was severe, the Property Level Protection measures did not provide the degree of protection that had been expected, with 31 properties flooded and damaged.

The principle inundation route at these properties was floodwater rising up through the floors (at 45% of the flooded properties) and floodwater leaking past the lower door barrier seal (at 30% of the flooded properties).

Groundwater flood risk and the potential for floodwater to rise up through the floors was not fully recognised, assessed or mitigated. Pumps were discounted at the time on the basis of affordability and on the view that the rapid response catchment results in only short duration floods. Only two properties, on the advice and insistence of the owners, were provided with a dewatering pump to help control and manage this risk. Other properties experienced inundation up through the suspended timber floors, but without pumps had no means to reduce the water depth or damage. At some, a sudden inrush of floodwater was witnessed, this is considered likely to have resulted from the sudden failure of the timber floors and an equalisation of the hydrostatic pressure.

Evidence in some instances of poor storage of barriers, left outside resting on the seals (resulting in the de-lamination of seals) and being exposed to vermin, will have led to increased risks of leakage. Likewise, some barriers had been installed with incomplete or missing bolts or washers, highlighting the importance of ensuring resident awareness of responsibility for correct storage, maintenance and deployment.

Barriers at some locations were reported to have bolt fixings that didn’t adequately exert downward compression of the lower barrier seals. Renewed and thicker seals have subsequently helped with improved fixings.

The automatic airbricks and the non-return valves were considered to have functioned correctly, providing protection and helping to mitigate flood damage.

In addition to the findings related to the actual measures, there is evidence that the expectations and understanding of residents had been raised inappropriately, with many believing that the Property Level Protection measures would provide standards

of flood protection beyond what could reasonably be expected. As a result, some people had stopped their practices of moving valuable items upon receipt of a flood warning, in the belief that the risk of flooding had been removed. Individual responsibility for the maintenance, storage and deployment of the measures was eroded by the decision for the Property Level Protection measures to remain the property of Chew Magna Parish Council, rather than becoming the responsibility and ownership of the property owner.

Opportunities were missed to more clearly explain to residents the scope and limitations of Property Level Protection measures, through initial questionnaires, follow-up flood fairs, or letters. Significantly, residents were not provided with an individual Property Level Protection report: this would have described and emphasised the scheme objectives and limitations as well as presenting a record of the survey findings and recommendations. It would have also helped underline the individual resident's own responsibilities relating to the correct storage, maintenance and deployment of the measures; and the benefits of incorporating these issues in updated community and individual emergency response plans. UK Flood Barriers did provide explanation about product use to homeowners during initial installation as well as a user guide and spares box but it is evident that ongoing community engagement and regular checks and tests of emergency plans are needed to retain awareness and preparedness. A maintenance package was also offered by UK Flood Barriers, but uptake from residents was very low. As mentioned, retaining ownership of the measures with the Parish Council did not help in this respect.

An inappropriate sense of security from flooding was evident, exacerbated by a letter, or certificate of completion, issued to each resident, quoting standards of protection of up to a 1 in 1000 year return period in some instances. There were no cautionary remarks or advice that flooding could, and should, still be expected and planned for and no advice given about the importance of preparing an individual flood emergency plan. The completion certificate (as with the eligibility criteria and risk assessment) also only addresses fluvial flood risk, omitting risks from surface water and groundwater.

Figure 13 Sump pump in operation

Although the Property Level Protection measures helped protect some properties, many residents have now lost faith in the scheme and are concerned over future flood risk. Efforts have since been made to identify the condition and experiences at all of the scheme properties and recommendations are being made for possible enhanced measures such as dewatering pumps. It should be remembered that the Chew Magna Property Level Protection scheme was completed nearly three years ago, under very tight deadlines as part of the Defra pilot phase, with the intention of identifying learning points to take Property Level Protection forward. Many of the findings have since been adopted as good practice. The findings from this investigation however have been drawn together into a series of recommendations made to help manage future flood risk in the village. They will also help inform the best practice guide as part of the ongoing reporting and development of best practice in the use and deployment of Property Level Protection measures. Lessons learned from flood events provide opportunities to refine procedures, measures and plans for this important and evolving cost effective option of managing local flood risk.

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. Under the pilot scheme, homes and businesses were provided with a range of different flood resistance protection measures to prevent the ingress of flood-water. These included demountable flood barriers, pumps, a new drain, water-resistant external render and a flood wall. These bespoke measures were used to replace a range of improvised homemade barriers although sandbags continued to be deployed.

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 assessed the effectiveness of the grant scheme and what difference the government-funded measures had made to the people of the town and their attitudes towards flood risk. This found the protection measures had been very successful and have helped to reduce anxiety about flooding: wherever they were tested by the 2009 flood, the measures were successful in reducing disruption, damage and reinstatement costs. While it was recognised that the 2009 flood was a routine 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.

The study highlighted a number of other important benefits and factors in the development of the approach that were to lead on to the further expansion through the launch of the much larger £5.5m two year Defra Property Level Protection Grant Scheme:

- The implementation of the scheme reduced the need for flood risk management agencies to send emergency response resources to the town during the flood and allowed them to use these resources in other flooded areas;

- The experience of the 2009 flood boosted confidence in the reliability of the protection measures although participants still did not fully trust them and continued to rely on supplementary protection from sandbags;

- It was too early to judge if there was evidence of a demonstration effect whereby the scheme would inspire people to implement their own protection measures. At the time only one Appleby resident had been prompted by the scheme to buy his own protection measures and people in flood risk locations around the town showed little awareness of the scheme and had not changed their behaviour because of it;

- Participants did not believe that their insurance terms would be affected by the protection measures and so had not informed their insurers of the reduction in risk brought about by the scheme;

- Implementation of the grant scheme at the level of the community encouraged collaboration between residents. Collective implementation also fostered a greater sense of local solidarity, as did the inclusion in the scheme of local businesses as well as householders;

- The introduction of the scheme acted as a catalyst for local collective organisation and the creation of a town flood plan. Local leaders are now treated by the Environment Agency as part of their emergency response network and the town is less dependent on external help during flooding.

A number of factors affected the successful implementation of the Appleby 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 dedication of Environment Agency and district council staff in the area and their perception of property-level protection not as a "last resort", as it is sometimes seen, but as an option with unique benefits;

- The ability of these staff to win the trust and respect of local people;

- The commitment and financial support given to the scheme by local flood risk management agencies;

- The presence in the community of suitable leaders and social structures.

It was also noted that confidence in choosing measures might be a more important consideration than the cost of measures while the Government backing increased levels of confidence in both concept and products. Concerns were however raised

over the future performance and effectiveness of the scheme if measures are not properly maintained, if key people were to move away or if an absence of flood events causes participants to lose interest in flood protection. This emphasised a need and role for the local flood risk management agencies to provide ongoing support to scheme participants and community leaders.

Community plans and aftercare

Recent discussions with community representatives and the local police in Appleby confirm how the scheme continues to be effective and greatly appreciated. Many of the concerns highlighted at the time of the pilot have been addressed by the formation of a Flood Action Group and regular multi-agency meetings to review levels of preparedness and awareness.

The scheme has a mature and 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.

Figure 14 Flood Barriers Deployed in Appleby – with Backup Sandbags

Some 25 properties continue to benefit from the protection afforded by the barriers, pumps and local flood walls, including both residential and businesses such as local shops. The barriers have been deployed on a number of occasions, with the last flood in 2010, and on each event have all worked well. The local police sergeant stated "The scheme works fantastically well", maintaining the key to success is continued community support, multi-agency cooperation and well-rehearsed and updated plans.

An interesting point to note is how residents still deploy sandbags as an integral component of the overall response plan (see Figure 14). These are used as an additional line of defence placed up against the blue Floodgates and point to a continued reticence to dispense with the sandbags to rely solely on the Property

Level Protection measures. This imposes a considerable ongoing burden on the local Eden District Council (and others) in the filling, distribution and subsequent disposal of sandbags and efforts continue to end this practice.

It is clear that the community, local agencies and emergency services have established an effective system and emergency response plan to ensure the range of property protection measures in the Appleby remain operational and effective. Some 6 years after initiation this represents one of the most established and mature property level protection schemes in the country. It clearly highlights many elements of best practice and the benefits of the approach to managing flood risk and as such can continue to act as an example to highlight what can be achieved in other flood risk communities.

Flood Action 4 Buckingham

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. Messages, information and discussions are fed into the group and they take responsibility to ensure that the wider community is kept informed. An emergency plan for the community was made alongside 'Churches Together' who have non-flooded members and, usefully, are aware of the skills of their membership. The plan is implemented when required and supports those that do flood.

FA4B volunteers have undergone the National Flood Forums volunteer training programme 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.

Figure 15 Buckingham FA4B Group

In discussions with the Chair of FA4B a number of important points and issues were described relating to the scheme delivery as well as emergency response:

- The Buckingham scheme was promoted and delivered by Aylesbury vale DC as part of the Defra pilot, covering 96 properties

- The scheme was very well received and residents particularly welcomed being able to choose the type of product being installed. However more advice would have been beneficial to ensure the most appropriate Property Level Protection measures were provided for the person and the property in question.

- 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 but only a few had been provided with sumps and pumps. These have been installed by Whitehouse Construction operating on float switches and have been performing well. A few also had manually operated puddle sucker pumps.

- The decision on who were provided with pumps seems to have been a reflection of who was willing to have a sump cut into their ground floors. Many had recently installed under-floor heating and thus were unwilling to disrupt this to install sumps and drainage pipe-work.

- 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.

- There was a clear appreciation that water will still seep in to properties but this will hopefully be to manageable levels - typically to depths of just one inch. Residents recognise the residual risk that water will still seep through brickwork and rise up through the floor but pumps are a vital element in the whole Property Level Protection system 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 such tests with some residents choosing to opt out during the most recent event having deployed the measures in the November 2012 flood event. Greater levels of participation are being encouraged.

- There were some examples of disengaged residents who had no appreciation of how their products worked or should be installed in the event of a flood. These people remain reliant on the flood group volunteer flood wardens to install their measures.

- Some other examples exist of inappropriate measures being provided to people who again are dependent on the flood wardens for help e.g. elderly residents who cannot lift or install large flood barriers. This highlights the crucial issue of ensuring the correct advice is available and provided during product selection (it should not just be about choosing the most expensive!).

- There are important issues around personal liability of the flood volunteers that had to be addressed and overcome. This was resolved by establishing a

group of unpaid flood wardens who received training from AVDC and the Fire Service with liability being underwritten by AVDC upon successful completion.

- An important issue concerning threshold levels was highlighted. Differences between step threshold and lower floor levels were not clearly flagged in the surveyor's report or in the schedule of works passed to the installer. This led to examples of disagreements around finished flood protection levels in relation to 600mm maximums, with lower levels provided. Recommendations have been made that all relevant levels (floor and threshold) are clearly defined.

- Emphasis was given on the importance and need for a clear guide on the pros and cons of various measures at the time of specification so the correct measures are provided that are suitable and can be fitted by the resident.

- The group emphasise the importance of personal responsibility as in the end the homeowner must take charge, not simply rely on others.

- Insurers have been advised about the Property Level Protection measures and are declared on renewal forms but have not led to a reduction in levels of excess or premiums yet.

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 (EA) flood warning alert scheme, but the EA does not usually provide warnings 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 measures, so that everyone should know how to install each other's measures, in case anyone gets into difficulty. 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.
Aftercare, Operation and Insurance	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 have been especially useful for establishing how long it takes for the Property Level Protection measures to be comfortably installed, following an alert (around ¾ of an hour), and to keep residents 'on their toes,' providing an opportunity for residents to check their equipment and if it is being stored correctly, and practice installation. The dry-runs 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). The trigger limit has been set at a height corresponding to ¾ hour warning, in accordance with the time established by dry-runs that measures can be installed comfortably. 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. There is also a holiday-let in the village. This has its own mini-emergency plan outlined within the property, but benefits particularly from the key-holder system, and the measures being stored in a communal place.

Best practice recommendations

Introduction

Successful Property Level Protection schemes require a combination of technical and behavioural factors to work together: independent and comprehensive property surveys are an essential pre-requisite, followed by well designed and installed flood protection measures; while homeowners and communities need to have a clear understanding of their responsibilities to store and maintain their measures, together with emergency plans for their timely and effective installation.

More than 2,000 homes in over 100 communities have received property level protection measures as part of schemes funded by Government and the Environment Agency. Extensive flooding in 2012 has now tested many of these Property Level Protection schemes and performance has been evaluated. The evidence received from local authorities and the Environment Agency reveals that for 84% of properties where Property Level Protection measures have been deployed and actually required, these measures have helped to reduce the impact of flooding.

This project has undertaken a systematic evaluation to understand performance of the measures, assess homeowner expectations and response and provide suggested solutions and highlight best practice recommendations.

Successful flood risk management

Media coverage highlighted how one property owner whose house was flooded four times in 14 months managed to hold back the water in this year's devastating floods after she took action to protect her home. Water from the River Bourne flooded the Kent village of East Peckham on Christmas Eve along with rain running off nearby fields - and then the River Medway flooded on Christmas Day. Thanks to resilience measures built into the property after floods in the 1990s and despite being faced with flood water 18in (45cm) deep outside the house, the homeowner ended up keeping most of it out with only an inch (2.5cm) inside (see Figure 16).

The successful **Appleby** scheme (Page 29) illustrated what can be achieved by fully engaged communities with a comprehensive package of Property Level Protection measures. Operational details were set out in emergency response plans and supported by regular flood group meetings and multi-agency integrated working.

Equally, the good practices that have been developed in **Buckingham** (Page 33) showcase how effective community support and partnership can build flood resilience and help individuals take responsibility for their own flood protection, with the support of community emergency plans.

The extensive flooding experienced during winter 2014 has illustrated more examples of how well delivered Property Level Protection schemes can help reduce stress and damage and also serve to bring communities together.

SUCCESSFUL FLOOD PROTECTION IN ACTION

- The village of East Peckham was flooded twice in two days over Christmas. Cars were left floating in other parts of the village.
- But one property fitted with Property Level Protection measures was saved thanks to flood gates and flood boards. These slowed the water enough to allow furniture to be raised on bricks before it got into the house.
- Water did ooze into the home, but this was immediately swept into a sump containing a submersible pump in the living room.
- A gully inside the house also took water from a drain near the front door straight to the sump, and from there it was pumped back outside again.
- Despite 18 inches of floodwater outside, the Property Level Protection measures kept most of the water away, with only an inch inside.

"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

Figure 16: Successful Flood Protection in Action

Realising the Potential of Property Level Protection

Such success stories should serve to encourage others to take similar action, ideally as part of a community group who can then offer and provide mutual support and advice. Figure 17 (below) identifies the key steps in Property Level Protection scheme delivery.

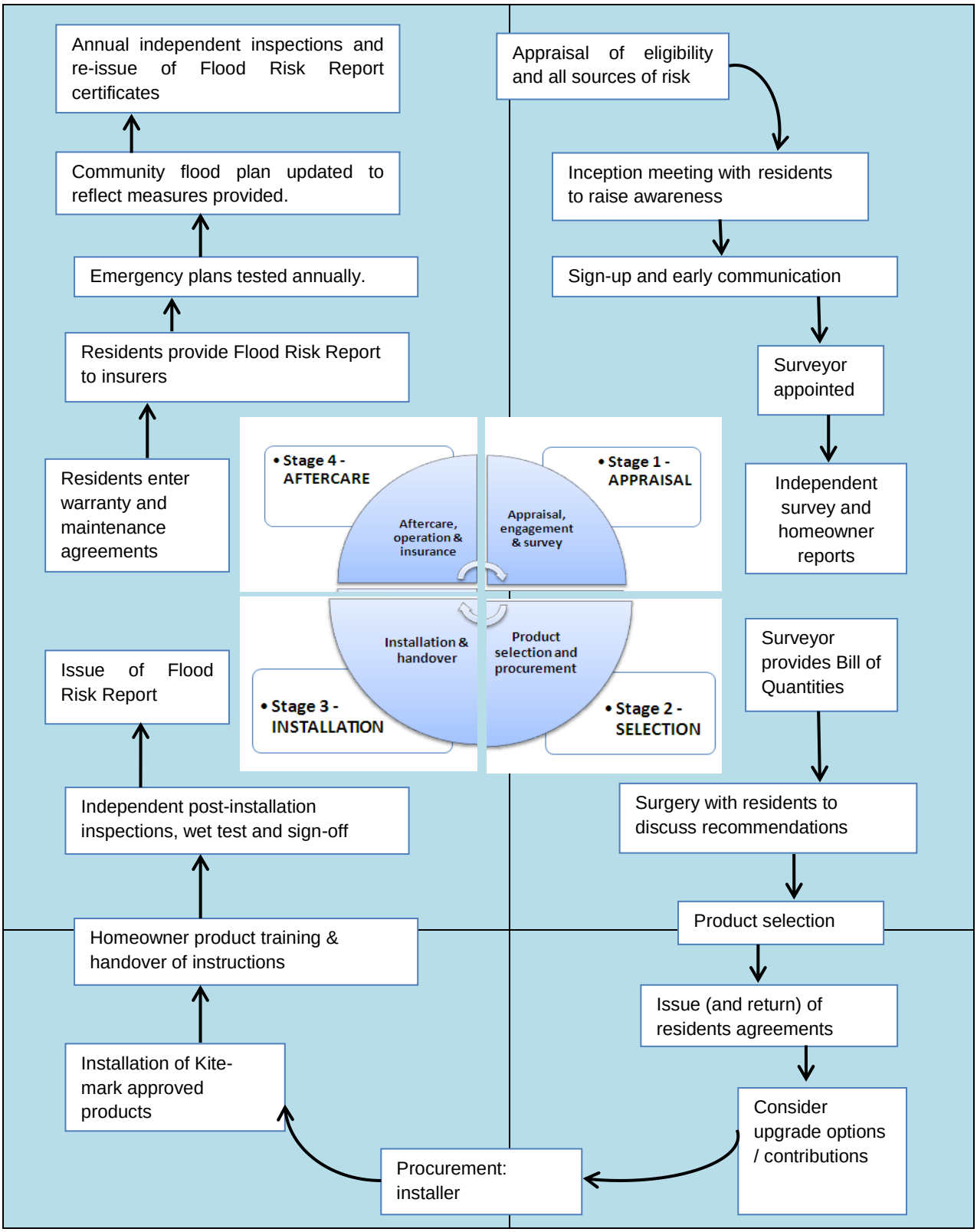


Figure 17 the Steps and Processes of Property Level Protection Scheme Delivery

In order for Property Level Protection to become a viable and reliable option for scheme managers in Risk Management Authorities to consider in the wider hierarchy of flood protection, the best practice steps emerging from this report are ordered in the four key stages of Property Level Protection: appraisal, selection, installation and aftercare.

Some of the key factors influencing best practice are summarised below, while further details are provided in the one-page Best Practice guidance notes presented in Appendix A.

Stage 1 – Appraisal, engagement and survey

Achieving a success outcome for a Property Level Protection scheme will depend largely on the extent and effectiveness of the community engagement; and the provision of independent high quality property surveys and flood risk assessments.

These two areas were highlighted as crucial factors following the Environment Agency's review of the Defra Property Level Protection Grant Scheme. The main points and recommendations for best practice that emerged from that review are summarised below:

Engagement

Many residents may not have experienced previous floods. Residents should be encouraged to work within their communities to share resources, experience and knowledge. Use local resources to help them understand the context better.

- Ensure the product is appropriate for both the property and for the resident.
- Be clear with residents about what is feasible with the funding available. Explain that expenditure over allocated grant will need to be topped up by contributions from residents or other sources.
- Be clear that residents own their Property Level Protection measures, that they are responsible for deploying their Property Level Protection measures and should plan how to do this. Property Level Protection measures will require regular checks and maintenance.
- Be clear on the benefits or effectiveness of Property Level Protection to residents.
- Residents should be aware of the height limit of the Property Level Protection supplied and that where the flood water level is above this, Property Level Protection will not give protection.
- Residents and installers should be encouraged to make the training as effective as possible. Consider a questionnaire with residents, post-installation to see if they feel adequately trained and retrain residents if necessary.

Survey

The pre-installation survey should look at all possible sources of flooding including rivers, the sea, surface water, groundwater, sewerage.

The pre-installation survey should look at all possible routes by which water can enter the property. Ensure the survey looks at the walls of the property as a route of water entry to the building. Consider measures to make walls more resistant such as re-pointing and water-proofing treatments to external walls, both above and below damp proof courses.

- Consider whether Property Level Protection will be effective if properties are on permeable soils and do not have concrete floors. Concrete floors may also need to be sealed or tanked.
- Consider using manual or automatic under floor sump pumps where appropriate. Mains electricity powered pumps may not be appropriate as electricity supplies may be cut off during flooding.
- Consider combining Property Level Protection with other flood risk management interventions to ensure a more robust solution.
- Consider the duration for which flood water will surround a property and its impact on the effectiveness of Property Level Protection.

In locations where a flood warning service is not available consider bespoke warning systems as part of the Property Level Protection package e.g. onsite water level alarms.

Key to success – product choice

"Work with the householder! Ask them what they are comfortable with. More able folk may well be suited to different solutions than older less able folk. Good selections of different solutions are needed dependent on the householder."

Scheme manager, Stroud

It is evident that the needs of the homeowner must be placed at the heart of all decisions and communications by the scheme managers, surveyors and installers. Early, effective and on-going engagement will result in enthused end clients (homeowners), who are prepared to retain the emotional and physical ownership of their measures and to effectively manage their own flood risk (in conjunction with an effective community group and local emergency plan).

Stage 2 - Product selection

There is often confusion around pump specification with a variety of options available to the homeowner (diesel/petrol powered pump compared to an electric pump, provision of

a back-up power supply such as battery-up or generator). The options are many and varied, and also include the provision of puddle suckers. It is recommended that the client satisfy themselves with the type of pump being provided, and whether a back-up power source will be provided through the funded scheme, at the outset of the project in conjunction with the independent surveyor.

Stage 3 – Installation and handover

Wet testing helps to demonstrates that the barrier/door is watertight (to both the homeowner and installer), and highlights any other potential flow-path for water ingress within that area. Whilst it adds an hour or two (depending on size) to each barrier or door installation, the value of wet testing is obvious. However, there should be recognition and costing provision made to allow such tests in tenders and an indicative cost put against it.

The **handover** process is critical to the success of a scheme. Whilst the majority of residents are fully engaged in this process, there are a number who simply don't wish to know, or say that they already understand how to deploy and maintain the products but without having been involved at any stage. From the limited feedback so far, this has been a significant problem when the measures were required in anger and at short notice. Clear instructions are needed for residents on how they are expected to store and maintain their defences.

Stage 4 – Aftercare, operation and insurance

Residents and communities should be encouraged to sign up to annual maintenance agreements with their product suppliers to ensure an effective and ongoing maintenance regime is adopted. This can either be an annual whole-of-community visit for a period of 1-2 days, or more specific with an appointment made for each property to service and maintain the products installed, as well as re-train residents in their deployment, where necessary. Furthermore, **independent audits** of product condition should be made annually by the original surveyor.

Aftercare – being prepared

"The after care and operation for us at Clare Hall was the shock part as we learnt so much in the next year. The learning curve was huge. We are all trained on how to install the flood defences should I receive the text telling us to be prepared. What shocked me was the speed of the water, it was amazing."

Property manager, Cambridge University

The suggestion made in the best practice guide (Appendix A) for handover, aftercare and ongoing maintenance are analogous with that of the MOT process that ensures the road-worthiness of vehicles. The annual testing of performance and condition by an independent and approved assessor, with the generation of an approved sign-off certificate (Flood Risk Report), is a statement of the Property Level Protection "road-worthiness" on an annual basis. Scheme managers should follow 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.

Summary

The performance and ultimate success of any Property Level Protection scheme in helping to mitigate flood risk depends on many factors. This is highlighted by the many points summarised above that, if overlooked, could lead to problems, but if adopted will all help to contribute to best practice.

The most important single factor to emphasise is the appropriate management of public expectation. Property Level Protection will not provide any guarantees that a property will no longer suffer from flood inundation, rather it aims to help manage the consequences by reducing the chances of floodwater damage.

Property Level Protection provides homeowners and communities with better tools than sandbags and make-shift DIY measures, enabling more positive and effective action to tackle flooding. It is important to stress this overriding principle at the initial community meeting when a scheme is being proposed. Once this has been understood people will have a clearer understanding of the objectives and what they will be required to do for successful deployment.

The evidence collected as part of this review illustrates both the pitfalls and the many positive benefits that can be realised for relatively modest investment in Property Level Protection measures. Success stories such as that highlighted in by the media in Figure 16 led the BBC news reporter to ask "Why don't more people adopt a similar approach?" It would appear this remains both an issue of increasing the awareness of the Property Level Protection approach and benefits; but also a willingness and acceptance by homeowners of their individual flood risk and a responsibility for taking effective action to manage that risk instead of relying on the authorities.

As more evidence of successful Property Level Protection deployment comes to light, both now and during future floods, awareness will increase and more communities are likely to recognise the benefits in reduced damage and stress by taking active and positive steps instead of doing nothing. Every encouragement should be provided by the operating authorities to help and promote such local action designed to empower local communities.

Department for Environment Food & Rural Affairs

www.gov.uk/defra

Annex A - FD2668 Guide for the Installation of Property Level Protection

December 2014

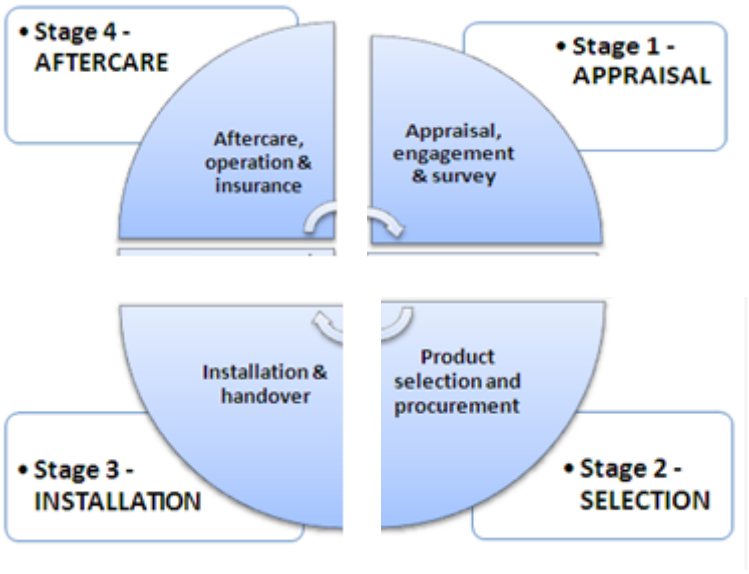
JBA consulting

Sharing Best Practice

Evidence and feedback has been collected from a wide range of stakeholders involved in the planning and delivery of Property Level Protection schemes, and from communities and homeowners who have received and installed Property Level Protection measures on their properties.

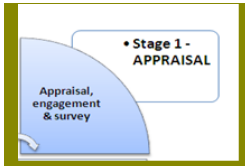
This evidence has been reviewed in light of experience gained in scheme delivery and consolidated into a 'best practice guide'. This draws out those experiences from across the industry and captures the wide range of factors to be considered and addressed. These have been presented under each of the four stages of a scheme: namely appraisal, selection, installation and aftercare.

It is hoped this evaluation will ensure that experiences are shared in order to help consolidate Property Level Protection approaches and contribute to Property Level Protection becoming a widely established, effective and robust long-term option for managing local flood risk.



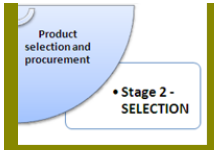
Annex Figure 1 Four Staged Approach to Property Level Protection Evaluation

The term Property-Level-Protection (Property Level Protection) is the common term used to describe installing measures to reduce the level of damage to individual properties from floodwaters. However, it is increasingly being understood as Property-Flood-Resilience. This is because effective action to reduce the risk of damage by floodwaters in individual properties encompasses a wide range of actions: installing measures (like flood barriers or air brick covers) to block apertures; minor building maintenance (such as repointing brickwork and sealing pipe and cable entry points); and, active preparation by the householder through a "Flood plan" and signing up to EA or other local alerts.



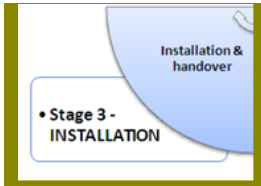
Appraisal Best Practice

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 Property Level Protection 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: EA, 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 clearly 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, ideally 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 are a vital requirement to provide impartial advice to homeowners and support to scheme promoters throughout the process.
1.12	Property surveyors should use the Defra/EA 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.



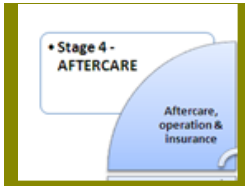
Selection Best Practice

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 Property Level Protection 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	The wider use of 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.



Installation Best Practice

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 have been unable to lift or install their products they received without help from others in their community. This emphasises the importance of engaging competent and accredited property surveyors able to provide independent and impartial advice
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.



Aftercare Best Practice

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.

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.

Annex B Telephone Interview Template

- Contact Name: _____
- I just wanted to give you a call to follow up the online SurveyMonkey survey you completed for _____
- Thanks for doing that! The purpose of this research is that we're conducting a national research study for DEFRA, looking into the post-installation status of property-level protection schemes.
- I was hoping you might be able to expand on a few of your answers for this?

Property Level Protection (Property Level Protection)

Post-Installation Effectiveness Questionnaire

Thank you for completing the Property Level Protection Scheme Survey on SurveyMonkey.com.

We are extremely grateful for your feedback as we look to identify and address any problems, share experiences and develop a best practice guide for Property Level Protection scheme delivery. We hope you can spare a few more minutes to help us gather more detailed feedback by completing this questionnaire, please

Property Level Protection Scheme Name: _____

1) Please identify the number of properties in the scheme where Property Level Protection measures were...	
...deployed and prevented ingress of floodwater	
...deployed and there was limited ingress of water, reducing the impacts of flooding	
...deployed but made no difference to water ingress	
...not deployed in time	
...deployed but not required	
...not deployed	
Other - Please State:	
Total:	

2) For those properties where Property Level Protection measures were deployed but made no difference to water ingress, please identify the number of properties where this was because...	
...Property Level Protection measures were not deployed correctly	
...Property Level Protection measures were damaged (due to poor maintenance or storage)	
...Property Level Protection measures were incorrectly installed	
...Property Level Protection measures were overtopped	
...flood barriers' lower sills failed	
...non-return valves failed	
...the sump pump failed	
...the property was generally flooded by water ingress through the floors/walls	
Other - Please state:	
Total:	

3) For those properties where Property Level Protection measures were deployed and there was limited ingress of water, please describe how floodwater may have entered the properties.

4) What are your local flood warning arrangements? How and when are these triggered?
5) Has an emergency plan been produced by the community?
5a) If yes, please outline the emergency plan:
6) Where Property Level Protection measures were deployed but in the end not required, were any lessons learned or recommendations made regarding local flood warning and deployment?

7) Has a dry-run test been conducted to rehearse deployment and emergency plans? *If not, please advance to Question 8.*	
7a) If yes, how frequently have you conducted dry-runs?	

7b) In your dry-run(s), were any problems found that, in the event of an actual flood, would have decreased the effectiveness of the Property Level Protection measures? If yes, what lessons were learned?
8) What are the benefits and drawbacks of conducting dry-runs?
9) How frequently do you think dry-run tests should be conducted?
10) Did the local flood group encounter any problems during deployment? If yes, what?
11) Did the residents know how to install their measures?
12) Do you think residents are capable to deploy their measures?
13) Did residents living in rented accommodation know about the flood measures?

14) Do you think residents are sufficiently aware that carrying out alterations to their property can create routes for water to bypass their measures?

15) Do you think maintenance and adequate storage were emphasised enough to the residents?

16) How would you tackle the problem of Property Level Protection maintenance?	
Increased use of automatic measures	
(Greater) Public buy-in	
More active flood groups	
Supplier maintenance agreements	
Annual checks and emergency exercises, linked to insurance premiums	
Other - Please state:	

If you have any further comments, please write them below.

Thank you for your time. Please return this document as an attachment to alistair.davies@jbaconsulting.com by Friday 8th November 2013.

Annex C Telephone Interview Compiled Responses

Telephone interviews were held with respondents of the online questionnaire. Notes compiled from these discussions are outlined below.

Columbia Road, Bournemouth: Paul Ambrose

- 2 of 2 properties deployed and prevented ingress of floodwater.

Two properties were protected. Passive Property Level Protection measures were installed on the property, and the road above these properties' drives was raised to channel water away from the property, so that it preferentially flows down the road. The properties are still threatened by flooding, however, particularly due to passing traffic causing waves of water to run over the drive thresholds.

There is no clearly identified community, and there are no local flood arrangements. The properties are not covered by the EA's flood warning alert scheme as they are only affected by surface water flooding. The council also cannot provide flood warnings; Bournemouth is not covered by a flood warning scheme. The best available flood warning scheme is Dorset's county-wide warnings, which are not always applicable. Therefore, the deliberate installation of only passive Property Level Protection measures was advantageous to the properties. During a large Bournemouth-wide flood event on the 18th August 2011 (a 1 in 80 year event in the town centre) the properties were successfully protected from flooding.

The interviewee suggested he put in for the measures because the funding was available and it was too good an opportunity to not at least try. However, because of the small scale of the project, found the process very bureaucratic. The interviewee suggested as much paperwork was needed for two properties as probably would have been needed for 20. The scheme was largely initiated because one half of the semi-detached property complained to the council. However, the other half of the property weren't too concerned by what was only ever shallow flooding. They were more concerned about the hassle of installing the Property Level Protection measures. Reportedly, they weren't concerned with their property flooding: they had lived with the flooding for generations, had a tiled kitchen, and the floods were never very deep. The measures were installed so that the property as a whole could be protected, though. Asked if the interviewee would undertake such a small scheme again, the interviewee said due to the hassle, such a scheme would probably only be pursued if there were strong (political) pressure raised by a resident. If, as in one half of this semi-detached property, the residents were not concerned about the flooding, the council would probably not undertake such a scheme again.

Braunton, North Devon: Paul Robertshaw

- 1 of 5 properties deployed and prevented ingress of floodwater.
- 4 of 5 properties deployed and there was limited ingress of water, reducing the impacts of flooding.

This was because: 1 property had drilled a hole in their wall, allowing water to bypass their measures, in 1 property a drainage U-bend had been missed during the property survey, leading to flooding, and in another property, a pump that was meant to remove floodwater had not been supplied, leading to flooding. The ingress was therefore caused by the operation itself; the Property Level Protection measures themselves had worked well.

The residents receive flood warnings from the EA's flood warning system.

An emergency plan has been set up by the community, but is short of an implementer, and the community has no back up. Previously, when it came to a flood event they didn't know what to do, and by the time they had decided what to do, their properties had flooded; they were aware of the potential for flooding, but they did not deploy their measures in time. The local authority is currently trying to make a better emergency plan for them, in collaboration with the local parish council. The interviewee was uncertain but sceptical that dry-run tests had been conducted. The interviewee recognised the benefits of dry-runs as being useful to show what can fall down in the case of an actual flood. However, the interviewee thought that local businesses in particular would be reluctant to participate, and the residents reluctant to give up their time. It was recommended that dry-run tests should take place once a year.

The interviewee recommended that residents should be made more aware that by carrying out alterations to their property, ingress routes can be created to bypass their Property Level Protection measures. The interviewee suggested that the only real way to implement a strategy against this, other than stating at the start of the Property Level Protection scheme, would be through inspections, but that no-one has the money or time for this.

The measures were guaranteed for one year after installation, and at the end of this period the manufacturer came and checked how the measures were being stored and if they were still adequate. Supplier maintenance agreements were recommended to tackle the problem of Property Level Protection maintenance.

Hele, North Devon: Paul Robertshaw

This Property Level Protection scheme was not implemented as the residents would not admit they flooded. However, it is thought that highways agency work done in the area may have reduced the impact of flooding there – there have been no reports of flooding in the area for around 10 years.

South Zeal, Okehampton, Devon: Jackie Smith

- 14 of 14 properties deployed but not required.

The scheme was built to protect properties from a 'flashy' stream. The residents are signed up for the EA's flood warning alert scheme, but the EA does not usually provide warnings because the stream is too flashy. In between the SurveyMonkey response and the phone interview, a water level has been installed on the watercourse. 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 residents. The village's emergency plan is very comprehensive, also covering snow amongst other hazards. The water-level alert device has helped the community because before, the flood wardens used to stay up all night to judge the watercourse and the Property Level Protection was deployed anyway, in case there was a flood at night. Now they only have to deploy when there is a warning. The respondent noted that 'it is unlikely that the community would have benefitted from any other scheme.'

The village signed up to Exercise Watermark. The Parish Council organises a dry-run test to be conducted once a year. This is conducted on 'Parish day,' when other Parish activities are also conducted, ensuring maximum involvement. The dry-runs helped to establish how long it takes for the Property Level Protection measures to comfortably be installed, following an alert (around ¾ of an hour). The warning trigger limit was therefore set accordingly. The dry-runs were reported as being useful to keep the residents 'on their toes,' and allow an opportunity for residents to check their equipment; one lady wanted to check field mice had not eaten through the cover for her Property Level Protection defence. There is also a rented property in the village. The dry-run is therefore useful to train the residents of this property how to install their measures. It was noted that the flood group is pro-active in educating people about their flood defences, anyway. The respondent suggested once a year is a good frequency to conduct dry-run tests. It was suggested that a higher frequency of testing would mean that the runs become a bind, lowering participation. A dry-run to test the new alert system is being considered at the moment. A wet-run of the pumps provided to pump out water from a courtyard is also wanted, but has not been possible due to a lack of water!

The flood group has had few problems during deployment. The residents know how to install their measures, having been educated through a training evening run by Floodgate, before the measures were purchased. Further to this, all of the properties installed the same measures, meaning everyone should know how to install each other's measures, if anyone gets into difficulty. External help 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 to get access to other properties. The flood-protection measures are also kept in a communal area. However, the respondent noted that these two practices were probably only feasible due to the village's strong community, and that this would probably not be possible in a more urbanised community.

There is also a holiday-let in the village. This has its own mini-emergency plan outlined within the property, but benefits particularly from the key-holder system, and the measures being stored in a communal place.

The scheme was implemented with an emphasis on maintenance and adequate storage. This was especially true for the pumps provided: These were locally sourced so that if there was a problem, the residents could go and get them fixed locally. The residents are aware they are responsible for their own measures, and signed an agreement to this effect.

Active flood groups and annual checks were cited as the reasons why the scheme has been successful in ensuring Property Level Protection maintenance, and recommended ('at least check and store the Property Level Protection measures appropriately') to tackle Property Level Protection maintenance in other schemes. 'This scheme was implemented under the old terms where match funding was not required. When surveyed after completion, the residents stated that if they had needed to contribute, some of them would have pulled out of the scheme.'

'Securing funding can be time consuming. I feel that in cases where there is a justified need, funding should be fast tracked, and where residents are on a low income, schemes should be fully funded.

'Insurance companies need to make allowances for residents/communities who have invested in products to protect their homes.'

Alconbury and Alconbury Weston: Chris Allen

- 4 of 72 properties deployed and prevented ingress of floodwater
- 2 of 72 properties deployed and there was limited ingress of water, reducing the impacts of flooding
- 32 of 72 properties deployed but not required
- 34 of 72 properties did not respond when surveyed

Where there was limited ingress, it was the expected levels. However, in some instances barriers did not fit properly.

The residents use **EA Floodline** for flood warnings. The respondent was not sure if the community has an emergency plan.

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 this wet-run, the residents were happier with their defences, and there have not been calls for sandbags to be sent to the village since.

Dry runs were described as difficult for the council to organise and get involved with due to their limited available time. They are made less time-effective still when it is thought that resident participation may be low. Additionally, the council felt that it had done enough to educate the

residents when the measures had been installed. These reasons were cited as to why a dry-run had not been conducted. However, the respondent did note that, having seen a wet-run, a dry-run could have helped the residents. The interviewee suggested dry-runs should probably be conducted every two years. It was suggested that the council would be very willing to *help* with a dry-run, but does not have the time or funding available to *organise* dry runs.

The interviewee hoped that a system of neighbour self-help was still in place for barrier installation, but has not been to the site for a number of years. It was stated that the residents themselves chose the barriers, so that it was the hope of the council that they would have arranged suitable provisions for barrier installation, accordingly.

It is thought that maintenance and adequate storage were emphasised enough to the residents, and it was noted that the residents had to sign to keep the measures accordingly. The measures were given to the property, and not the residents. During deployment, no problems caused by storage were found. To improve Property Level Protection maintenance, however, increased use of automatic measures (wherever possible) and annual checks and emergency exercises linked to insurance premiums were thought to be possible ways of improving Property Level Protection maintenance, although it was noted that securing an insurance benefit would be difficult.

Finally, it was noted that it is difficult to seal old properties where water comes through walls or properties. Despite this, the residents still noticed a reduction in ingress and their confidence in the Property Level Protection measures rose.

Fillongley: Keith Evans

The interviewee was uncertain on the numbers, and some properties did not have Property Level Protection installed. However, it was suggested...

- 11 deployed and prevented ingress
- 1 (or 2) property (/ies) deployed but made no difference to water ingress
- 1 (or 0) property (/ies) did not deploy

One property was not able to deploy their Property Level Protection measures because they were new to the area and had just had new windows and doors fitted. They were unaware of what the Property Level Protection measures were.

The village has a level monitor installed, with an alarm being sent to a local resident once the water reaches a certain level. This resident then cascades out the warning. This has worked well, but at one point the alarm was not working, and the level of activation had to be altered from its initial level because it was being activated too frequently.

The interviewee was not sure if a dry-run has been conducted. They thought dry-runs are useful so that people know what to do in the event of a flood, but also suggested persuading people to participate could be hard to do. A frequency of around once a year was recommended.

The interviewee was uncertain of how well the measures are maintained. They recommended, however, that annual checks and emergency exercises would help maintenance, and regular update from the EA and/or the council to remind of the impacts of flooding would also be helpful.

On the whole, it is thought the scheme worked very well – the council has not been proactive in assessing the scheme, but has not heard of any flooding, barring the property where the windows and doors were changed.

South Derbyshire Property Level Protection: Timothy Summers

This scheme grew and morphed. Some properties ended up with very involved protection and others with minor Property Level Protection installs. On the whole, however, around 50 properties were involved, and most of these deployed and prevented ingress of floodwater. Some had (expected) limited ingress of water, for example resulting in the wetting of doormats. Two properties were classed as making no difference to water ingress. In one property, the Property Level Protection measures held back the water for a number of hours, before the property was rapidly flooded. It is thought that this effect was caused by hydrostatic pressure. In the case of the other property, the Property Level Protection measures worked as they were designed to do so, but due to a flooding irregularity, the house became surrounded by water and the back of the property had not been protected, so the property was still flooded.

The community relies upon the EA flood warning system and council alerts, derived from Met Office data and upstream monitoring. This part of the Trent predictably floods '72 hours after everywhere else,' meaning these sources are particularly reliable.

An emergency plan has been produced by the council, although it is not specific to Property Level Protection and region-wide. Dry-runs have not been conducted by the community. When deployed in a wet-run, however, 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. Maintenance of the measures was an issue, despite the fact that the respondent believes maintenance and adequate storage were emphasised enough to the residents. It was noted that this indicates the importance of community-level 'drills' and preparedness training, especially in areas that are prone to flash floods. However, the council cannot do as many as it would like due to a lack of resources. It was recommended that dry-runs should be conducted once a year.

To tackle the issue of maintenance, the respondent believes the best way forward is increased use of automatic measures, but also believes self-encouraged engagement would help a lot.

The respondent reported it was difficult enough to find door barriers that fitted and worked for the properties that people like aesthetically, without factoring in the ability of the residents to deploy the measures, so no steps were taken to address this issue. Subsequently, elderly residents often had barriers installed which are too heavy for them to fit alone. As an aside, the respondent noted that the weight of barriers and ability of the residents should seriously be considered in conjunction with one another. While previously overseeing a flood event, the respondent saw an elderly gentleman collapse from a heart attack into flood water after lifting

sandbags. He subsequently died. The respondent noted this should be a consideration regarding the suitability of barriers for property owners.

The respondent particularly noted an issue with rented properties. The measures were given to the property, but often the residents were unaware that the measures existed, and often took the view that the property was not their house, so they were not concerned about installing the Property Level Protection defences. The respondent also noted that it is very hard to take account of the ability of the homeowner to set up defences in rented properties, where there is often a high turnover of residents.

The measures installed in this scheme did work well. In fact, once other residents had seen them work in an event, many properties that had not initially taken up the council's recommendations self-funded measures. Many of the properties in this scheme suffer from groundwater ingress. Even though some of the properties still flooded badly, the homeowners reported they greatly reduced flooding and were very pleased they had the measures. The respondent noted that the council is wary that a study has suggested that people become complacent around 3 years after a flood event, so that reminders of the impacts of flooding should be given to residents so that they continue to maintain and practice with their measures.

Girton Village, Nottinghamshire: Richard Bates

20 properties had Property Level Protection measures installed, but the respondent did not know how successful these measures were. The respondent knew that some of the measures were damaged due to poor maintenance or storage. Some seals had perished, and the residents were not confident in the measures – they asked for sandbags up against the Property Level Protection measures. The residents are signed up to the EA flood warning system for the River Trent, and have an emergency plan, although the respondent did not know details of this. This does involve links with neighbouring parish councils for residents to come and help the village, in particular the elderly who may not be able to install their barriers. The residents had conducted a dry-run, and did so annually, but the respondent does not know if this practice has continued. Maintenance was, however, emphasised to the residents. Although the dry runs were thought to be useful, the respondent noted that they obviously were not doing them properly as when the flood event came, some measures were damaged. The respondent noted that seasonal dry-run tests would help in the case of this area, as the river floods seasonally.

The major issue with these scheme is that the residents wanted (and still want) a bank to be constructed to stop the village from flooding. This has led to the villagers being disinterested in Property Level Protection, which has been the scheme's major downfall. The residents were also trying to get the council to pay for the maintenance of their measures, which the council does not have the money for. The measures were given to the homeowners (not the property).

On the issue of maintenance, the respondent noted that increasing public buy-in may have improved maintenance, but certainly would have reduced uptake.

Buckingham: Charles Butters (LA) and Roger Parkinson (Flood Warden)

- 1 of 90 properties deployed and there was limited ingress of water, reducing the impacts of flooding
- 89 of 90 properties deployed but not required
- One property, which had a pump in their basement kitchen, came close to flooding. Water came up between the damp-proof course and the wall.

The properties are on the EA flood warning system, and were obliged to join as part of the Property Level Protection scheme. The local flood group also uses its own knowledge of the river to alert residents when they know the river is actually going to flood (the EA service tends to be a bit over-cautious). The flood group was told by the district council that it was their responsibility to organise and protect themselves.

The flood group has arranged a comprehensive emergency plan whereby when the EA issues a flood alert, volunteers are contacted to check they are available for the people who have said they need help installing their measures. If a flood warning is issued, the flood wardens hold a meeting, and then email people to advise whether to install their Property Level Protection barriers. They also liaise with an emergency committee group via teleconference, and will go round door-knocking if the water levels become very high.

The flood group found in this wet-run that some people were not prepared for a flood, even though they had been told to practice deployment (dry-runs) before. The local flood group has really struggled to get people to practice installing their measures, or even to install them in wet-runs. A dry-run is held every year in June (when it is dry) but the flood group really struggles for participation.

In the wet-run, volunteers did not feel they had sufficient authority to instruct people to put up protection. They have requested ID cards so that they can better help people put their measures up, and enter their properties to do so. The volunteers were also uncertain as to whether they were insured to do the work they were doing. The flood group was also blamed by a resident for not putting up their measures, and threatened with legal action, despite at the time telling the wardens they did not want help installing their measures. The flood group members are now unpaid employees of Aylesbury Dale District Council, so are covered by their insurance. Practice runs have been beneficial, however, identifying heavy boards, access problems and where people did not know how to install their measures.

The residents own the measures, but they are also tied to the property. Most residents know how to install their measures, but some needed help to do so. However, the respondent notes that it was the choice of the property owner as to which barriers were provided. Every resident has been trained to put up their devices or has a trained helper.

Maintenance was emphasised but some residents still did not adequately store the barriers. To improve maintenance, the respondent recommended regular reminders and education, and a system by which annual checks and emergency exercises are recognised in insurance

premiums. The local flood warden recommended a central body be created that can go around areas with Property Level Protection measures and provide 1-day (so that it's cost-effective) checks if people so wish.

This scheme also provided measures to university accommodation, and the university took up responsibility to put up the measures, as the students were not bothered to install them themselves.

The flood warden recommended that the statement of work and datum are placed on the same page of the surveyors report, otherwise the installation can occur to the wrong height.

The council takes the view that they do what they can, and if people would like help, they should ask for it, but the residents themselves need to organise the aftercare in the majority for the Property Level Protection.

The flood warden believes that, on the whole, people are very happy and confident in their Property Level Protection measures. In fact, the major problem is communicating to people that they are not 100% protected from flooding once the measures are installed, and that the measures will only work if maintained and installed correctly.