South West Property Flood Resilience Pathfinder

Baseline Report

Final Report

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Cornwall Council

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This report describes work commissioned as part of the South West Property Flood Resilience Pathfinder, managed by Cornwall Council. Peter, May, Phil Emonson, Beth Jones and Holly Cavill of JBA Consulting carried out this work.

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Purpose

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Executive Summary

The PFR Baseline Assessment

The South West Property Flood Resilience Pathfinder is one of three Defra funded projects commissioned in September 2019 and due to complete in September 2021. The projects across Yorkshire, Central England and the South West were chosen to receive funding to boost research into, and uptake of, Property Flood Resilience (PFR) which aims to better protect homes and businesses from flooding. A range of Pathfinder initiatives, demonstration centres and advice portals aim to help raise awareness and take-up of PFR by all stakeholder groups, highlighting the benefits of adopting PFR for residential and commercial properties and helping to significantly reduce the impacts of flooding across the UK.

This report provides an evaluation of Property Flood Resilience (PFR) delivered to residential properties across Devon, Cornwall and the Isles of Scilly, forming a baseline survey as part of the South West PFR Pathfinder project (a further survey is underway for non-residential properties). It summarises the feedback provided by stakeholders around levels of PFR uptake, barriers to the use of PFR, successes and failures, behaviours, pitfalls and best practice. A comparison is made of delivery across the South West with other examples nationally and provides a wider overview of the industry, drawing conclusions to spotlight the opportunities PFR presents in contributing to effective flood risk management across the UK.

The Evidence

The baseline survey evidence reveals the focus has almost entirely been on the provision of grant-aided, lower cost resistance measures, rather than the more invasive and costly resilient adaptation measures. Generally low levels of awareness remain while the survey findings confirm only modest use has been made of PFR for residential properties across the South West. This has been delivered by a variety of routes by the Risk Management Authorities but with no coherent delivery plan. The early PFR supplier framework was established by the Environment Agency in 2010 but could not be used by Local Authorities and after 6 years of sporadic use was then abandoned for a further 2 years, directly impacting the wider PFR industry. Whilst the replacement National PFR Framework can now be used by all Risk Management Authorities, there have still only been 40 schemes provided by the Local Authorities and Environment Agency over the past decade. Collectively these have provided enhanced flood protection to just under 800 residential properties across Devon and Cornwall. This excludes an unknown number of properties where PFR measures have been funded and installed privately, which is very difficult to capture and quantify.

The majority of schemes have been completed by the Local Authorities, either as part of the early Defra Pilot schemes or as part of countywide grant schemes. Only a few schemes have been completed by the Environment Agency across Devon and Cornwall, either under the initial framework or indeed under the current framework. These have also been as part of wider flood alleviation schemes, rather than standalone PFR schemes. This is in direct contrast with the Environment Agency's neighbouring Wessex Area who have led PFR delivery rather than the Local Authorities, having provided PFR to several thousand properties across their Area.

During the earlier absence of an accessible PFR supplier framework, Local Authority led countywide grant schemes were established. By their nature, these tend to result in piecemeal delivery, driven by individual applicants scattered across the South West region, rather than provided to communities. Property owners have experienced difficulties in securing PFR contractors and funding constraints have further limited take-up, while overall effectiveness of outcomes is further constrained by the lack of any cohesive community emergency plan.

Policy Objectives

With such low levels of take-up, and at the current rate of only c80 properties per year across the South West, there will only be a further 1,520 properties that will have benefitted from PFR by 2039. Furthermore, these will be of variable standards and with a risk of ineffective outcomes. It is therefore clear that a major change is required if Defra and Environment Agency objectives are to be met and the FloodRe transition to affordable flood insurance driven by market forces occurs.

The challenge has been acknowledged: the **Environment Agency's FCERM Strategy** committing Risk Management Authorities to **mainstream Property Flood Resilience** measures that reduce flood damage and enable faster recovery for local communities; likewise, Defra initiatives such as the PFR Roundtable and the PFR Pathfinders support Defra policy objectives seeking to boost uptake and standards of PFR, to create a nation more resilient to future flood and coastal erosion risk.

The **National Infrastructure Commission's assessment** has emphasised the growing risk from climate change, which will continue to make extreme flood events more likely in future years. The National Infrastructure Commission highlight the urgent need for decisive policy action, to mitigate these risks and make cities, towns and villages resilient by 2050.

Urgent Actions Needed

Clear evidence from this baseline assessment confirms that a major change in policy and attitudes is essential if these ambitions are to be realised. Current initiatives such as the PFR Pathfinders and Defra's Innovative Resilience Programme will help raise awareness and encourage increased demand from property owners. This will no doubt be led by the demands from insurers for effective and widespread flood mitigation action. The PFR Code of Practice will also help establish improved standards and effective outcomes. However, the Code of Practice will remain a voluntary code, encouraging and informing actions by individual property owners. To really make an effective impact and dramatically increase take-up rates, this will need to be supported by a renewed and concerted effort by all Risk Management Authorities to deliver the strategy's ambition to mainstream PFR.

Evidence from this baseline assessment concurs with the many PFR scheme and best practice reviews completed for Defra over the past decade: **the means of delivery is critical to whether successful outcomes** are achieved. Proactive, funded community PFR schemes delivered by competent suppliers and coordinated and managed by Risk Management Authorities provide the means to achieve the significant increase in numbers of properties afforded protection.

Whilst the evidence confirms that many property owners prefer actions that seek to protect their property and keep floodwater out, there is a place for resilient adaptation. Such resilient adaptation, to allow floodwater entry, requires substantial investment, as well as resulting in significant disruption to properties. This is clearly best delivered as part of 'build back better' initiatives, as part of the recovery process after a flood. However, it should be recognised and accepted that the cost for full property resilience remains beyond the scope of Government funded business cases, without a major shift in Treasury Green Book cost/benefit rules. Hence the prevalence of resistance schemes delivered by the Environment Agency and Local Authorities.

Mainstreaming PFR

With over 5 million properties in the UK currently at risk of flooding, and flood risk set to increase with climate change, it will not be possible to provide engineered flood defence schemes for all. This is where PFR has such an important role to play. The NIC assessment notes that for too long, flood management has been reactive and a shift to proactive intervention is needed and advocates for a long-term strategy for flood protection that would allow a nationwide standard of resilience to flooding, such that ideally, no one should be exposed to flooding. This would help minimise the enormous cost of flood damages; but it would also help address the human impact of flooding, which creates severe impacts on quality of life, particularly mental health.

As this baseline assessment has shown, the ambitions of Government, insurers and property owners will not be realised without a **major step-change in delivery and attitude by Risk Management Authorities.** It is clear from the extremely low rates of take-up that we cannot afford:

- to wait for the next severe flood, when we can deliver another piecemeal and reactive Government funded recovery grant, which will not deliver these objectives; or
- to leave individual property owners to act on their own, even with the added benefit and use of the PFR Code of Practice to encourage best practice and successful outcomes.

It is however clear from this assessment how these ambitions can be met, with a concerted step-change in attitude and behaviour by all Risk Management Authorities. PFR must not remain marginalised, seen as something others do, with the risk of uncoordinated piecemeal delivery and funding constraints, leaving properties only partially protected and remaining at flood risk. With the Environment Agency taking a lead in behaviour change by all Risk Management Authorities, PFR schemes must be accepted as viable options as part of project appraisal and adopted proactively, alongside traditional flood defence schemes. Through collaborative partnerships, an established nationally available PFR procurement framework, and with challenging PFR delivery and outcome measure targets over the next 6 year funding cycle, would all help realise the step change needed, in turn helping progress towards the better protection afforded to some 200,000 properties remaining at significant risk.

Behaviour change that is led by Risk Management Authorities will help mainstream the delivery of quality PFR schemes to communities at risk. This in turn will encourage even wider take-up, demonstrating PFR as an accepted and established flood risk management tool, helping the many thousands of property owners to increase their flood resilience, emergency plans and preparedness. This will reduce damage and allow the provision of affordable flood insurance. It will also provide the much-needed relief from the devastating and stressful impacts of flooding, bringing peace of mind today and in the face of future climate change.

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Abbreviations

BRE	Building Research Establishment
BSI	British Standards Institution
CC	Cornwall Council
CDM	Construction Design and Management
CIWEM	Chartered Institute of Water and Environment Managers
CoP	Code of Practice
DCC	Devon County Council
DCIoS	Devon, Cornwall and Isles of Scilly
Defra	Department for Environment, Food & Rural Affairs
EA	Environment Agency
ECC	Exeter City Council
EPS	Emergency Planning Society
FCERM	Flood and Coastal Erosion Risk Management
FDGiA	Flood Defence Grant in Aid
FRA	Flood Risk Assessment
IoS	Council of the Isles of Scilly
JBA	Jeremy Benn Associates
LLFA	Lead local Flood Authority
NRV	Non-Return Valve
PAS	Publicly Available Specification
PCC	Plymouth City Council
PFR	Property Flood Resilience
PLP	Property Level Protection
RFCC	Regional Flood and Coastal Committee
RICS	Royal Institution of Chartered Surveyors
RMA	Risk Management Authority
SW	South West
SWW	South West Water
TC	Torbay Council

1 Introduction

1.1 The Defra Pathfinder Projects

The PFR Pathfinders are three national Defra commissioned projects, originally running between September 2019 and March 2021 but now extended until September 2021. The projects across Yorkshire, Central England and the South West were chosen to receive funding to boost research into, and uptake of, Property Flood Resilience (PFR) which aims to better protect homes and businesses from flooding.

Through the Pathfinders, research initiatives, demonstration centres and advice portals will help raise awareness and take-up of PFR by all stakeholder groups. These resources aim to highlight the benefits of adopting PFR for residential and commercial properties, helping to significantly reduce the impacts of flooding across the UK.

This report forms a baseline study for the South West Property Flood Resilience Pathfinder. The other two Pathfinder projects are:

- **The Oxford-Cambridge Pathfinder:** The Oxford-Cambridge Pathfinder, led by Northamptonshire County Council, is centred on the delivery of one million high-quality homes across their study area, including neighbouring counties, by 2050. Ten communities will be identified to engage with the project, ensuring resources to promote and install PFR are prioritised in the areas most vulnerable to the impacts of flooding.
- **The Yorkshire Future Flood Resilience Pathfinder:** The Yorkshire Pathfinder, delivered by the City of York Council and supporting partners the Yorkshire Integrated Catchment Solutions Programme (iCASP) and JBA Consulting, are working with communities, planning and construction professionals, the construction industry and the insurance sector. The initiative aims to encourage greater uptake of PFR measures across the Yorkshire Regional Flood and Coastal Committee (RFCC) area. The project also aims to establish a community hub and learning lab, working alongside existing projects and initiatives in the area, providing staff to deliver a large-scale training programme.

1.2 South West PFR Pathfinder Project

On behalf of the South West RFCC Region, Cornwall Council (CC) was successful in its application for funding from Defra to undertake the South West PFR Pathfinder. The project seeks to raise awareness of PFR and its role in flood risk management in communities at risk of flooding across Devon, Cornwall and the Isles of Scilly. The project also focuses on local innovation to enhance the future take up of PFR.

The South West PFR Pathfinder is being delivered through a series of eight work packages:

- **SWPFR1** – Baseline
- **SWPFR2** – Awareness of PFR Framework
- **SWPFR3** – Tools (Website)
- **SWPFR4** – Industry Engagement
- **SWPFR5** – Training
- **SWPFR6** – Demonstration Site
- **SWPFR7** – Exit Strategy
- **SWPFR8** – Dissemination

The SWPFR1 – Baseline work package focusses on investigating where PFR has already been installed and understanding opinions of PFR from a range of stakeholder groups. These include residents, community groups, risk management authorities, businesses, and those operating in the PFR industry (e.g. product suppliers).

In summary, the work package aims to:

- Assess the current uptake of PFR across the study area,
- Assess the different delivery approaches taken,
- Identify future schemes where PFR may be beneficial, and
- Investigate blockers to the uptake of PFR.

Figure 1-1 identifies the South West RFCC and the Lead Local Flood Authorities (LLFA) within this region.

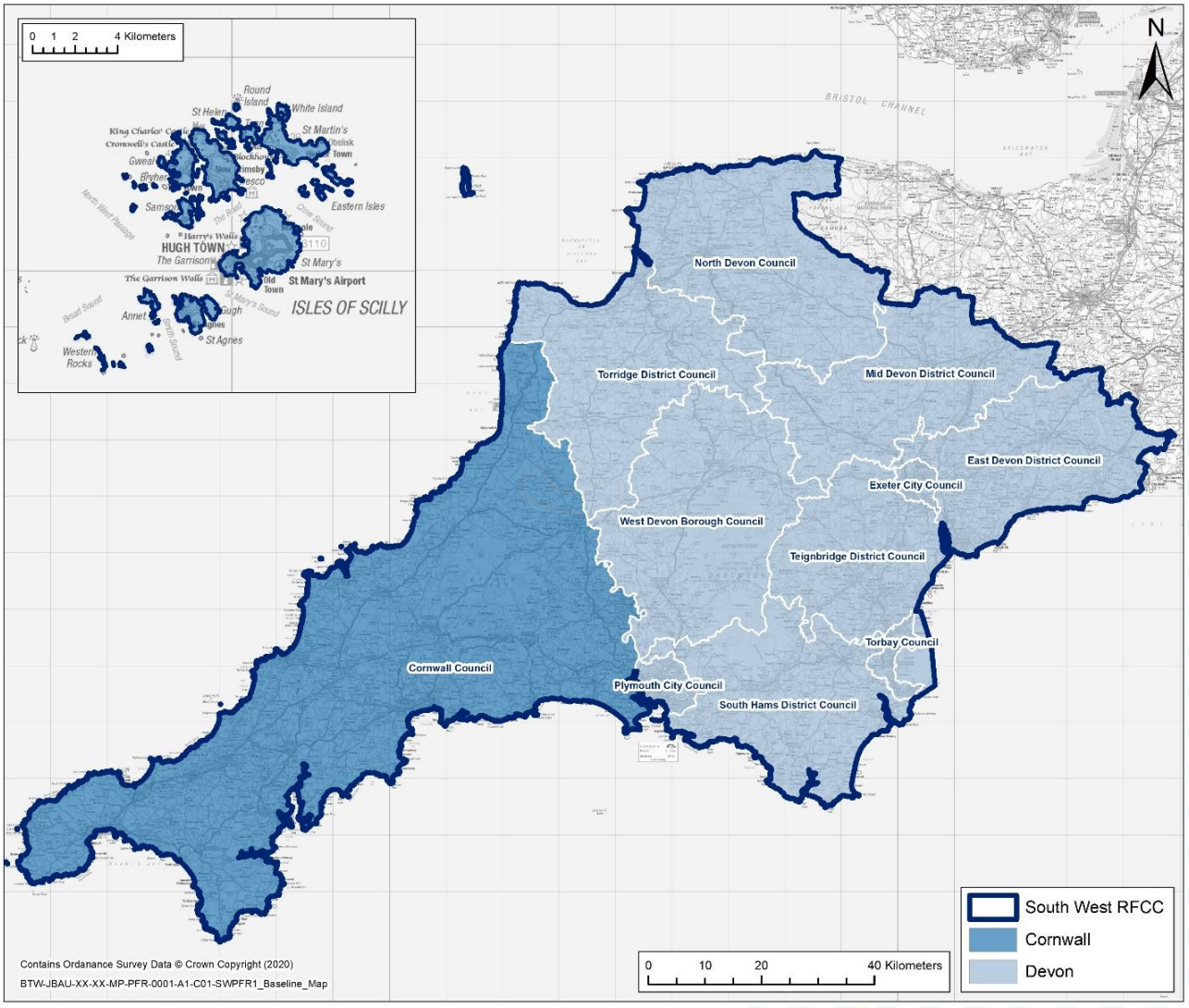


Figure 1-1: South West RFCC Study Area

1.3 Report Structure

This report provides an evaluation of Property Flood Resilience delivered to date across Devon, Cornwall and the Isles of Scilly. It captures uptake, barriers, successes and failures, behaviours, pitfalls and best practice, and compares delivery from across the South West with other examples nationally. Importantly it also provides a wider overview of the industry, drawing conclusions to spotlight the opportunities for PFR in contributing to effective flood risk management across the UK.

The report is structured as follows:

- **Chapter 1** – Introduction
- **Chapter 2** – Background Summary of the PFR Industry
- **Chapter 3** – PFR Experience in the South West
- **Chapter 4** – Blockers to PFR
- **Chapter 5** - Commentary
- **Chapter 6** – Future PFR Opportunities in the South West
- **Chapter 7** – Concluding Remarks

1.4 Property Flood Resilience – What We Mean

Property Flood Resilience (PFR) is the outcome achieved by installing property protection measures (resistance measures) or undertaking internal resilient adaptation (resilience measures) or a combination of the two. Resistance and resilience are defined below:

- **Protection Measures:** Resistance measures aiming to reduce flood damage by limiting the amount of water entering a property. Protection measures include door barriers, flood doors, flood gates, automatic airbricks, non-return valves and pumps.
- **Adaptation Measures:** Resilience measures that adapt and modify the internal fabric of a property to reduce damage if water does enter, enabling a quicker recovery following a flood. Adaptation measures include tiled floors, waterproof wall coverings and raised electric sockets among a wide range of other measures.

2 Background Summary of the PFR Industry

2.1 Introduction

Whilst catchment level options and engineered flood alleviation schemes will continue to provide a high standard of protection to communities at flood risk, it is not possible to provide everyone with such schemes. Property Flood Resilience (also widely known as Property Level Protection - PLP) now provides individuals and professional partners with practical and cost-effective options to help reduce flood risk using affordable bespoke products or through internal adaptation measures. These offer an innovative and effective response which 'plugs the gap' that previously existed between engineered flood protection schemes and either sandbags or the 'do nothing' option. How PFR fits into the flood protection hierarchy can be seen in Figure 2-1.

Encouraging the wider use of PFR, allied to effective flood warning and raising awareness, will help inform and empower communities to take effective action themselves. With effective resistance and resilience measures, the approach aims to help build improved flood resilience, reducing damage and financial loss but also, importantly, providing welcome "peace of mind" for those at flood risk.

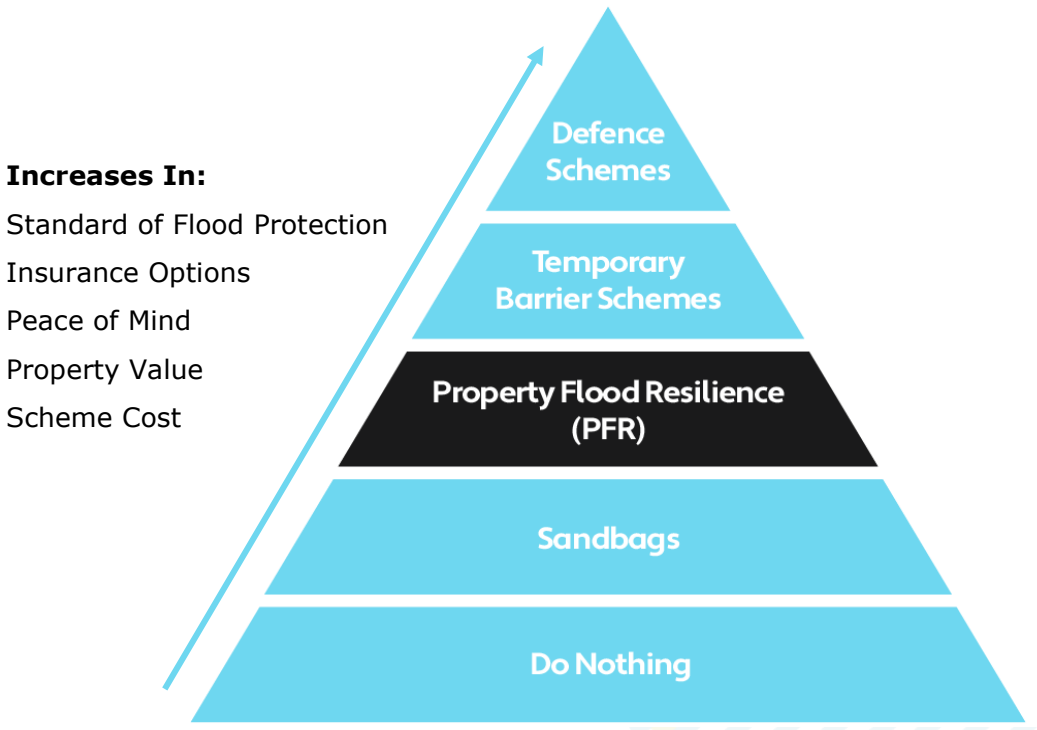


Figure 2-1: The Flood Protection Hierarchy

'Resilience' is a term which has become widely used across the industry over the last 10-15 years, and whilst many definitions exist, resilience at its core is about the ability to recover from shock. In the context of PFR, this includes activities and actions, not just adaptation or the provision of products. Any successful PFR scheme aims to create a legacy beyond the end of the scheme by supporting individuals and communities with training, advice on products (e.g. storage, maintenance and deployment), and the creation of emergency/continuity plans.

Residual risk will always remain, and it is important that this is not overlooked. Properties with flood resistance and resilience measures may well see some flood water still enter a property, but if this can remain at a manageable level, then damage, stress and financial loss (and claims) can be significantly reduced.

2.2 Evolution of the PFR Industry

2.2.1 2009-2014 - Early Pilot Schemes and Associated Research

Following the significant 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. These issues were also identified in the 2007 post-flood review led by Sir Michael Pitt, who recommended use of a wider portfolio of flood protection measures.

Since the introduction of the British Standards Institute PAS1188 Kitemark in 2003, a range of products have been tested and shown to be effective and widely available. However, subsequent flood events revealed that many property owners and operating authorities continued to rely on ineffective sandbags. This was also found to be the case in Wales, where a pilot grant scheme was launched by the Welsh Government in 2004. Although this generated considerable interest, few schemes were completed, and the scheme was discontinued.

The Defra-led research, which focussed on England, was accompanied by a series of 6 pilot schemes, funded as part of Defra's Making Space for Water programme. This explored approaches to developing flood risk management and to encourage wider uptake of PFR. These pilots explored various options for delivery and were accompanied by extensive stakeholder engagement, consultation, and workshops. They helped highlight three key barriers to the uptake of PFR:

- Public funding;
- Insurance response; and
- Lack of awareness.

As a result, Defra announced a £5 million **Property-level Flood Protection (PLP) Scheme** to be coordinated by Local Authorities with Environment Agency (EA) overview. The grant scheme was implemented in two phases over two years, with an extension of one additional year. The pilot schemes provided funding support to homeowners for flood risk surveys, and the installation of PFR measures, but did not extend to include commercial or business properties.

The overall objective of these Defra pilots was to promote the use of PFR in cases where flooding occurred frequently but where other conventional/engineered flood risk management solutions were not economically, environmentally, or technically viable. It aimed to demonstrate the benefits and generate case studies to encourage others to adopt a similar approach. It was also hoped that the schemes would increase the overall levels of flood awareness and community engagement.

The programme ran for 2-years from early 2009 to March 2011, and in that time over £5.2 million had been awarded to 63 individual schemes, offering practical flood protection solutions to around 1,100 properties. This equates to an average outturn cost of approximately £4,800 per property. This analysis confirmed that the schemes provided good value for money, with an average benefit cost ratio of 4.8 for locations where a capital flood defence scheme had previously been prohibitive and uneconomic. The schemes provided improved levels of flood protection and the prospect of additional peace-of-mind for 1,100 families who until then experienced frequent and repeated flooding.

An evaluation of the Defra Property-Level Flood Protection Scheme was carried out for Defra and the EA by JBA Consulting in 2011. This brought together evidence and feedback from 40 of the 63 schemes which were awarded funding. The evaluation found the schemes:

- provided support to communities that experienced frequent flooding where traditional solutions are unviable;
- helped raise flood awareness and encouraged self-help and effective action;
- encouraged partnership working and local engagement; and
- served to stimulate the market to provide quality flood surveys and innovative flood protection products.

The scheme also identified a number of key findings, including the need for a greater amount of time for engagement activities to raise understanding and awareness of PFR. Additionally, having more examples and case studies of PFR in place were thought to be an effective way of providing evidence going forward, which would in turn encourage greater uptake.

The report also identified the need to ensure clear **independence** of the surveyor from the supplier / installer, to avoid the possibility of suppliers promoting their own product range which is not necessarily suited to the homeowner or property. Many stakeholders, including the National Flood Forum identified how this helps ensure the appropriate suitability of measures for the end user is considered.

A further finding of the evaluation identified a need to undertake a more detailed analysis of the costs and benefits of providing PFR measures to residential properties. This study entitled '**Establishing the Cost effectiveness of Property Flood Protection: FD2657**' was commissioned by Defra, carried out by JBA Consulting and Dr. John Chatterton in 2012 and required to inform the developing policy for PFR.

A new and extended model, which built on the previous study undertaken by Entec UK in 2007-08, incorporated the latest data on the economic damages from flooding and the costs and benefits of a range of flood protection measures, updated to a 2011 price-base perspective. The FD2657 study found compelling evidence for the cost effectiveness of manually deployed flood resistance measures, which were found to be more than twice as cost beneficial as automatic measures, with high benefit cost ratios and high Partnership Funding Outcome Scores for typical flood thresholds of up to 2.5% annual exceedance probability (1 in 40 year). The higher cost of automatic resistance measures resulted in lower benefit cost ratios but significant cost-effective opportunities for schemes with appropriate levels of contribution, but at typically lower flood thresholds of 5% annual exceedance probability (1 in 20 year). The high cost of resilient adaptation measures indicated that these are a less cost-effective option and therefore cannot be justified under H M Treasury Green Book rules or factored into Environment Agency or Local Authority schemes funded by Flood Defence Grant-in-Aid (FDGiA).

The research carried out again highlighted the low levels of awareness and understanding of PFR within communities. As a result, the '**Property Protection Advisor'**[1] was developed for Defra as a follow on from the cost effectiveness research, utilising the detailed and comprehensive date already obtained. This internet-based tool, hosted by the National Flood Forum, can be used by property owners to understand the potential PFR options available to them, the typical range of measures and indicative costs.

Similarly, the '**Six Steps to Property Level Flood Resilience: Guidance for Homeowners**'[2], developed as part of the SMARTeST project led by Manchester University, looked at technologies, systems and tools that can improve the safety of the built environment in relation to flooding. This document identified six steps, accompanied by a concise checklist, to provide guidance and support to homeowners at risk of flooding. The six steps are outlines as follows:

1 Understanding the Risk
2 Planning – First Considerations
3 The Property Survey
4 Product Supply
5 Product Installation
6 Operation and Maintenance.

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

2 https://www.bre.co.uk/filelibrary/pdf/projects/flooding/Property_owners_booklet_v2_web_(2).pdf

The guidance document **'Flooding and Historic Buildings'**[3] was also released by Historic England in 2015, for those involved with managing historic listed buildings, providing guidance on suitable PFR and ways to manage flood risk. The guidance describes how many historic buildings are not only at risk from flood damage, but also damage from inappropriate remedial works carried out by contractors who may have little understanding of historic buildings.

2.2.2 2010 - 2017: EA Flood Resistance Measures Framework

The EA Flood Resistance Framework ran between 2010 and 2017, originally on a 4-year framework but was extended by 3 years. This framework offered a means for the EA to proactively procure PFR services from approved suppliers, but Local Authorities were unable to make use of this. However, many Local Authorities also modelled schemes on the same basis, consisting of two Lots:

- Lot 1 – Independent flood risk property survey and post-installation audit
- Lot 2 - Product selection, design, and installation

The framework was used by numerous EA teams delivering a range of community schemes, including for the River Thames Scheme and by the EA Wessex Area Team to deliver an extensive PFR Programme. When the framework ceased, there was a two-year hiatus before a replacement was launched. Due to the sudden lack of activity during this time, the impetus was lost and many suppliers on both Lots either ceased trading or moved away from PFR.

Since this framework could not be directly used by Local Authorities, there remained inconsistencies in approach. In the absence of any other procurement route for PFR, many Local Authorities relied on existing supplier arrangements which often overlooked the complexities of PFR and did not follow best practice guidance.

2.2.3 2014: Post-Installation Effectiveness of Property Level Flood Protection (FD2668) and Best Practice Guide for Local Authorities

Following flooding in 2012, Defra commissioned a study to investigate the post-installation effectiveness of PFR measures, to help capture evidence of the deployment successes for many householders who had been involved in the earlier pilot schemes. Engagement with EA, LLFAs, homeowners and community groups focused conclusions around four stages of PFR delivery: appraisal, selection, installation and aftercare. A number of key findings emerged, including:

- 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.
- The need for use of Plain English.
- Training and accreditation is key to gaining trust of homeowners and scheme promoters and will enable consistency across the industry.
- The quality of installation works, and subsequent inspections and sign-off, is in many regards the most critical element of the process
- The benefits of wet-testing as part of the product installation and handover process

The report identified a number of challenges in creating legacies in communities, and put increased focus on aftercare, homeowner training, post-installation audit, local flood emergency plan arrangements, product warranties and product storage/ maintenance. One of the most important messages to come out of the review was the need for product testing and trial exercises, 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.

3 https://historicengland.org.uk/advice/technical-advice/flooding-and-historic-buildings/

The review was also informed by a case study of post-installation performance of PFR in the village of Chew Magna, Somerset. Chew Magna was one of the first communities to receive PFR through the initial Defra pilots, and at the time held up as an example of best practice delivery. Undertaken by JBA in 2013 following extensive flooding in 2012, the review sought to understand why around half of the 69 properties provided with measures suffered varying degrees of flood inundation and damage, leading to anger and concern. The review identified that as well as poor handover and maintenance information provided, leading to many barriers being left in the garden exposed to the elements, with the resultant deterioration of barriers seals, the predominant ingress route was water rising up through the floors. No properties had been provided with pumps, and thus had no means to regulate water levels beneath floor levels or evacuate and keep water at a manageable level internally to reduce damage. Opportunities were missed to more clearly explain to residents the scope and limitations of PFR measures, exacerbated by a letter, or certificate of completion, issued to each resident, falsely quoting standards of protection of up to a 1 in 1000 year return period in some instances.

The many findings from this post-installation evaluation report then featured in a PFR Best Practice Guide for Local Authorities and have become accepted as critical components of PFR, helping to increase and embed preparedness.

2.2.4 2014: 'Repair and Renew Grant' and Associated Research

In April 2014 following extensive flooding throughout the UK, a government recovery grant scheme, the Repair and Renew Grant, was initiated. This scheme offered a £5,000 grant to property owners who had flooded internally between 1 December 2013 to 31 March 2014 to make their properties more resistant/resilient to flooding.

The grant was to be delivered through Local Authorities, but no funding was provided to facilitate delivery. Unlike the earlier Defra Pilots, this did not allow for adequate engagement with communities to encourage uptake. The support and guidance offered Local Authorities was limited, resulting in inconsistencies in delivery. While there was mention in the guidance of an initial flood risk assessment survey, and a maximum of £500 (inclusive of VAT) which could be claimed for this, it was not mandatory and there was no need for it to be carried out by an independent party. There was also no requirement for a post-installation audit to ensure that all ingress routes identified had been accounted for and to ensure that homeowners were able to deploy, store and maintain measures. Kitemarked measures were identified in the guidance, but there was no requirement for such measures when claiming the grant.

Many Local Authorities did not have the time or resources to properly utilise the scheme and the lack of guidance around the use of Kitemarked measures saw a rise in companies selling untested and sometimes ineffective products to homeowners.

In 2014, the Scottish Government commissioned a study to assess the benefits of PFR. The research showed that as awareness and implementation of PFR expands, more communities are likely to recognise the benefits in reduced damage and stress by taking active and positive steps to protect their properties. The study resulted in a blueprint for Local Authorities to implement PFR schemes in high risk communities.

2.2.5 2014-15: Surveying for Flood Resilience in Individual Properties (FD2681)

In 2014 Defra commissioned a consortium to develop an evidence base to support objectives in driving take-up of PFR and building flood resilience by developing a cohort of competent surveyors. The project was delivered by a consortium of JBA Consulting, University of Manchester, Manchester Metropolitan University, the National Flood Forum and Turnstone Learning.

The research sought to draw on analogous practical examples and case studies to identify the role of the PFR surveyor. These included exploring commensurate international practice (in Australia; British Columbia, Canada; and the United States of America), as well as case studies from other fields in the UK that could serve as a model (e.g. the Green Deal; Secured by Design; and Smoke Control Areas and Heating Appliances).

Through research, and interviews / questionnaires, the competencies required by an independent flood risk assessor (iFRA) were defined, being split into the following categories:

- Property: suitability of PFR; structural limitations; building construction
- Products: Kitemark standards; installation standards; suitability for person and property
- Flood: hydrology / hydrogeology; flood risk management; data management
- Person: aftercare; communication; community and client liaison

A Knowledge and Skills register was proposed, setting the training route-map for the iFRA. A certification option for Defra to consider was proposed, based on the three-pillar model of PFR, namely person, property and flood, and the organisations felt best suited to represent these in terms of skills and competencies:

- Person – Emergency Planning Society (EPS)
- Property – Royal Institute of Chartered Surveyors (RICS)
- Flood – Chartered Institute of Water and Environmental Management (CIWEM)

All three organisations expressed an interest and willingness to support the process, but this wasn't taken any further at that time by Defra.

2.2.6 2015: Flood Resilience Grants

Flood Resilience Grants of £5,000, using the same model as the 2014 Repair and Renew Grants, were made available after flooding in the winter of 2015.

These recovery grants provided an opportunity for flood victims to introduce resistance or resilience measures, although the guidance and delivery was beset with inconsistencies and a lack of learning from the earlier Repair and Renew Grants. Uptake was therefore piecemeal, again with a lack of coordination in many areas. The 2015 floods generally affected communities in the North of England, and whilst some Local Authorities adopted a coordinating role, many simply weren't set up to administer or provide the levels of support homeowners needed. Therefore, many residents were left to again fend for themselves, with little or no guidance on product standards, no need for independent flood risk assessment survey, and managing sometimes unscrupulous contractors. There was also no mechanism for independent audit, meaning the homeowner had no recourse against poor workmanship.

2.2.7 2016: Defra Roundtable

Defra launched a cross-industry Roundtable and PFR Action Plan in 2016 to further explore the barriers to uptake and address why property owners may or may not take up PFR. This led to the creation of six task groups:

- Task Group 1: Community Innovation
- Task Group 2: Small Business Resilience
- Task Group 3: One-Stop Shop
- Task Group 4: Standards, Certification and Skills
- Task Group 5: Communications and Behaviour Change
- Task Group 6: Data Model

A range of initiatives have been promoted and developed by the Roundtable, including a Cumbria Showcase Resilience Project, creation of a website for homeowners and businesses and developing industry training courses. Alongside this, the Building Research Establishment (BRE) created a demonstration Flood Resilient Home, which generated interest and media focus.

Emerging from the Defra PFR Roundtable has been a project led by CIRIA (with a consortium led by BRE) to develop a robust and authoritative PFR Code of Practice (CoP) and consolidated guidance that aims to provide a standardised approach for the delivery and management of PFR. It is intended that the outputs from this will improve standards and confidence in PFR and subsequent take-up. The full guidance is expected later in 2020 or early 2021, whilst a standalone document was launched in February 2020. The voluntary code presents 6 standards that specify what should be achieved:

- Standard 1 – Hazard assessment
- Standard 2 – Property survey
- Standard 3 – Options development
- Standard 4 – Construction
- Standard 5 – Commissioning and handover
- Standard 6 – Operation and maintenance

2.2.8 2017: Low-Cost Resilience

In 2017, Defra commissioned the research project 'Supporting the Uptake of Low-Cost Resilience', led by the University of the West of England. The study examined the technical, social and behavioural aspects of supporting low cost PFR measures designed to limit damage to buildings during and after flooding.

It found that low cost measures are widely applicable as part of an integrated approach to limiting the residual risk to individual properties that may also include water exclusion measures. Phrases such as 'repairability' and 'recoverability' were introduced, seemingly to distinguish and simplify the previously adopted 'resistance and resilience', but community group feedback suggests these phrases far from adhere to the need for the use of Plain English when liaising with homeowners. Instead, more informal alternatives such as 'keep it out' and 'let it in and recover' have come to the fore.

It was shown that a number of opportunities exist for homeowners to introduce internal adaptation strategies for dealing with residual flood risk. Low cost measures can be adopted incrementally and cumulatively can help the recovery process be quicker and less disruptive.

Previous research though has shown that the true cost of making a property resilient through internal adaptation measures will exceed the HM Treasury Green Book rules. To that end it is most unlikely that a Risk Management Authority will receive approval to fund such measures, instead directing FDGiA or Local Levy funding towards lower cost resistance measures.

It remains important to make property owners aware of all the options available to aid the recovery process, from the small-scale intervention (such as rising butt hinges) to larger adaptive strategies (such as waterproof wall plaster and tiled flooring). In doing so the true cost of a fully resilient property needs to be demonstrated. Some may wish to and can afford to pursue this, and others have undertaken internal adaptations immediately after a flood (build back better) when the renovations are taking place and post-flood recovery grants are available. However, as the benefit of introducing one-off small-scale interventions is minimal unless adopted wholesale, the larger costs are therefore off-putting for many. Therefore, and as supported by National Flood Forum research, many people instead still prefer to try to keep flood water out in the first place (resistance).

2.3 Where Are We Now

2.3.1 A New Environment Agency Framework

In 2018 the Environment Agency replaced their previous supplier framework with the new PFR Framework lasting up to 4 years. The framework provides suppliers across 4 Lots:

- Lot 1 – Independent flood risk assessment property survey
- Lot 2 – Supply and install
- Lot 3 – Survey and install
- Lot 4 – Managing agent

Unlike the previous framework, this replacement can now be accessed by Local Authorities, and all UK Risk Management Authorities, creating an opportunity to drive consistency in delivery nationally. It reinforces the many benefits of a coordinated and funded approach to PFR delivery across community-wide schemes, delivered to a defined standard, and in doing so consolidates the need for contractors to undertake wet testing after installation to reassure property owners.

Whilst this current framework could run for four years until 2022, it does not align with the recent standards set out by the British Standards Institute (BS851188) and the PFR Code of Practice (CIRIA C790F). Together these standards aim to improve confidence in PFR as a solution to reduce the risk of flooding; improve the quality of PFR products and subsequently increase PFR take-up. It is critical that the framework reflects these industry standards. As such the EA are proposing to renew and retender the framework in 2021, based on these changing standards within the industry.

Three additional drivers for change are defined:

1 The framework is open for use by all Risk Management Authorities. Emphasis has been on Lead Local Flood Authorities (LLFAs) and the Environment Agency to use this framework, however, take up is currently relatively low. Of 152 LLFAs, only 21 (14%) have formally agreed to use the framework. This has reportedly been due to complexities and administration of LLFA procurement teams to sign the Deed of Agreement. To improve standards and provide national consistency, it is vital that the new framework is readily accessible to all.

2 PFR is a combination of resistance and recoverability (resilience) measures. An objective of the current framework is that the Lot 1 property survey "will also include the investigation of resilience measures (adapting inside the property), to limit the damage and disruption that occurs when water enters". Experience to date however is that surveys focus on resistance measures and provide limited benefit to the customer in regard to opportunities for improved recoverability. It is the EA aim to ensure that the surveys developed via this framework fully address recoverability. Whilst FCERM Grant in Aid funding may not yet be aligned in this regard, the survey will provide the customer with the tools required to make changes if financially viable, when other sources become available or to support the vision of the National Flood and Coastal Erosion Risk Management Strategy to 'build back better' following a flood via insurance/alternative funding streams.

3 Lot 3 under the current framework is for survey, supply and installation to all be led by the contractor. Impartiality and independence, a point which was highlighted in earlier PFR guidance and research, can be lost via this process and so the customer does not get an ideal solution. The new framework will not include this Lot.

2.3.2 Standards and Quality

The focus on standards and quality in product specification has been bought into sharper focus by the replacement and upgrade of the existing PAS (Publicly Available Specification) to a full British Standard Kitemark. PAS 1188 is a suite of standards in flood protection sponsored by the EA in 2003 and subsequently renewed in 2009 and 2014. It is widely accepted by industry that specification and testing are essential, both to drive innovation by manufacturers and also to protect homeowners and businesses. PAS 1188 was again reviewed in 2019 and BSI developed this into two full British Standards; BS 851188-1 and BS 851188-2. Part 1 covers products intended for use in the temporary sealing of openings, ingress routes and apertures, whilst Part 2 relates to temporary and demountable solutions.

2.3.3 Environment Agency's Long-Term Investment Strategy

The EA's 2019 Long Term Investment Strategy confirms the importance of PFR as a tool to manage flood risk now and in the future. It recognised that it is manual resistance measures which generally achieve the best value for money (as shown in earlier and ongoing research; that resilient adaptation is generally more costly for home and business owners). The Strategy documents show if PFR was applied in large numbers to 200,000 residential properties, risk could be reduced by 16%. Whilst this is acknowledged as an unrealistic aspiration, it shows the benefit and importance of PFR in managing flood risks.

2.3.4 Flood Recovery Grants (November 2019 and February 2020 Floods)

Two further PFR Recovery Grants of £5,000 for property owners were announced following the Winter 2019-2020 floods. The first was for the 2,000+ properties affected in South Yorkshire and the parts of the North Midlands in November 2019, and secondly for those 5,000+ properties (largely in South Wales and border counties such as Herefordshire, Gloucestershire and Shropshire) affected in Storms Ciara and Dennis in February 2020. Due to the COVID-19 restrictions, the application deadline was extended until July 2022. As with previous Grant schemes these are being administered by the relevant affected Local Authorities. Whilst many Local Authorities used their own consultancy frameworks or term contractors for the flood risk assessment survey, signing the Deed of Agreement and adopting the PFR Framework would help further promote the best practice and quality standards the insurance industry are expecting to see.

Experience gathered from this Grant scheme has again identified confusing guidance for Local Authorities, and no additional funding for scheme administration. As such, many Local Authorities required homeowners to appoint the independent flood risk assessment survey (rather than adopting a blanket, authority-wide approach for consistency, using the available framework), thereby paying their survey fee upfront before any Grant funds were subsequently released. In some instances, upfront payment of the measures is also a requirement, adding to the financial challenges many households are experiencing both from the flooding and now as a result of the ongoing COVID-19 pandemic.

2.3.5 Flood-Re

The 'Flood Re' reinsurance scheme, as agreed between the Government and insurance companies, was launched in April 2016 to replace the 'Statement of Principles'. Flood Re is designed to provide homeowners at risk of flooding with access to affordable flood protection insurance cover by placing a levy on all household insurance policies linked to council tax bands.

In some post-flood recovery situations, some insurers are now proactively encouraging opportunities to 'build back better'. In such instances, internal electrics can be raised, flooring, plasterboard and skirting replaced with waterproof alternatives, raised appliances and slide-out resilient kitchen units installed. These initiatives seek to reduce damage, stress and future claims, and will hopefully be encouraged by loss-adjustors and flood recovery specialists (e.g. the British Damage Management Association).

It should be noted that developments since 2009 and business premises do not qualify for Flood Re. Flood Re is expected to be in place for 25 years, allowing a transition to a risk-reflective market in flood insurance.

It is intended that homeowners in high risk properties put in place suitable protection (such as PFR), so that damages are limited, and insurance remains affordable after Flood Re ends. The post-installation audit process provides an opportunity to document the measures installed, their standards (e.g. BSI Kitemark), when handover and training took place, and whether any residual risk remains. This forms important evidence to provide the insurer, to be updated and reviewed as part of an annual audit and deployment test, akin to the annual MoT. In time, and with sufficient evidence that PFR products are well installed and well maintained, the insurance industry may be able to provide betterment to customers who have invested in resistance or resilient adaptation as a result of reduced damage and claims. Indeed in the Flood Re 2020 annual report stated *'Subject to consultation, this will allow claims to include an additional amount so that flood resilience measures are included in repairs and allow households that have property flood resilience measures in place to benefit from lower premiums'.*

2.3.6 Defra Policy Statement: Better Prepared Communities

One of Defra's goals is to "create a nation more resilient to future flood and coast erosion risk. In doing so reduce the risk of harm to people, the environment and the economy.

- We will be better protected to reduce the likelihood of flooding and coastal erosion.
- We will be better prepared to reduce the impacts when flooding does happen."

One of their five policy statements relates to 'better prepared communities', committing to:

- Guiding the design and location of new development
- Ensuring buildings, infrastructure and key public services are better prepared
- Supporting communities, including response and recovery.

Specifically, this notes how Defra will:

- Build on our Property Flood Resilience Pathfinder projects, to further boost uptake of property flood resilience in homes and businesses across the country – including through our new £200 million innovative resilience programme.
- Consult on changes to the Flood Re scheme to encourage greater uptake of Property Flood Resilience among households at high risk of flooding across the UK.
- Exploring, with Flood Re and insurance industry, whether it would be beneficial for insurers to share more information with customers about their flood risk and mitigating actions.
- Explore with Flood Re if it can do more to accelerate the uptake of PFR, which could include using the scheme's currently available funding.
- Explore ways to provide greater clarity about the use and effectiveness of PFR measures for homes and businesses at high risk of flooding, including how the benefits can be recorded.
- Review the current approach to flood resilient design to consider how to better ensure quality housing for all, as part of our wider commitment to support the development of high-quality buildings.
- Encourage a faster transition of the marketplace for PFR related advice, products and incentives.
- Encourage and strengthen the preparedness of local businesses and public services in flood risk areas.

2.3.7 National Flood and Coastal Erosion Risk Management Strategy for England

The EA's FCERM Strategy for England was laid before Parliament in July 2020 and published in September 2020. This sets out the EA's long terms vision of 'a nation ready for, and resilient to, flooding and coastal change – today, tomorrow and to the year 2100'. Three long-term ambitions, underpinned by evidence about future risk and investment needs are described:

- Climate resilient places: working with partners to bolster resilience to flooding and coastal change across the nation, both now and in the face of climate change
- Today's growth and infrastructure resilient in tomorrow's climate: making the right investment and planning decisions to secure sustainable growth and environmental improvements, as well as infrastructure resilient to flooding and coastal change
- A nation ready to respond and adapt to flooding and coastal change: ensuring local people understand their risk to flooding and coastal change and know their responsibilities and how to take action.

The strategy makes it clear that Risk Management Authorities will work with partners to "mainstream property flood resilience measures that reduce flood damages and enable faster recovery for local communities". It goes on to say "Risk Management Authorities can apply for Government grants from the Environment Agency for supporting property flood resilience projects in communities at high flood risk. The 2016 report from the Property Flood Resilience Roundtable, chaired by Peter Bonfield, called for a better national understanding of what property level resilience is amongst individuals, communities and businesses. Its ambition was for all those at high flood-risk to have the knowledge, capability and means to adapt their properties in ways that limit the physical damage of flooding on homes and businesses, and speed up their recovery (Defra, 2016)."

The South West Pathfinder and the other two PFR Pathfinder projects are delivering towards this objective.

The FCERM Strategy also references Flood Re (see section 2.3.5), stating there are proposals "designed to encourage the wider insurance sector to incentivise homeowners and businesses to build back better to reduce future flood damages, and not just put back what was there before."

3 PFR Experiences in the South West

3.1 Introduction

In order to better understand the current state of PFR awareness and uptake across the South West, a range of baselining and engagement investigations have been undertaken as part of this Pathfinder. Initially, key delivery and strategic partners have been asked to provide information on past PFR schemes and future PFR opportunities. This information will help us to understand where PFR has been used in the past, blockers to the uptake of this flood risk management tool and any successes or challenges we can learn from in the future.

3.2 Methodology

3.2.1 Data Collection

Data was requested from the Delivery Partners and relevant Strategic Partners shown in Table 3-1. It should be noted that this data was collected and collated during March and April 2020 and was correct at the time of receipt. It is anticipated however that certain schemes listed have evolved since that time and as such some of the numbers reported may not be latest at time of publication of this report. Where updated information is available this has been stated. In each case, a comment is provided on the success of the engagement activities undertaken. It should be noted that this is a qualitative view from the Risk Management Authority in question and does not necessarily reflect the outcome of the scheme in terms of uptake. The data request included detailed information on:

- **Previous PFR Schemes:** Location, flood risk source, property numbers, scheme dates, funding sources and measures installed.
- **Future PFR Opportunities:** Location, flood risk source, property numbers and additional information.
- **Blockers to PFR:** Reasons why it has previously been challenging to undertake PFR Schemes in the South West.

Table 3-1: Strategic and Delivery Partners in Receipt of Data Request

Organisation	Strategic or Delivery Partner
Cornwall Council	Delivery Partner
Devon County Council	Delivery Partner
Plymouth City Council	Delivery Partner
Torbay Council	Delivery Partner
Council of the Isles of Scilly	Delivery Partner
Exeter City Council	Strategic Partner
East Devon District Council	Strategic Partner
West Devon Borough Council	Strategic Partner
South Hams District Council	Strategic Partner
North Devon Council	Strategic Partner
Teignbridge District Council	Strategic Partner
Mid Devon District Council	Strategic Partner
Torridge District Council	Strategic Partner
South West Water	Strategic Partner
Environment Agency	Strategic Partner

3.2.2 Data Analysis

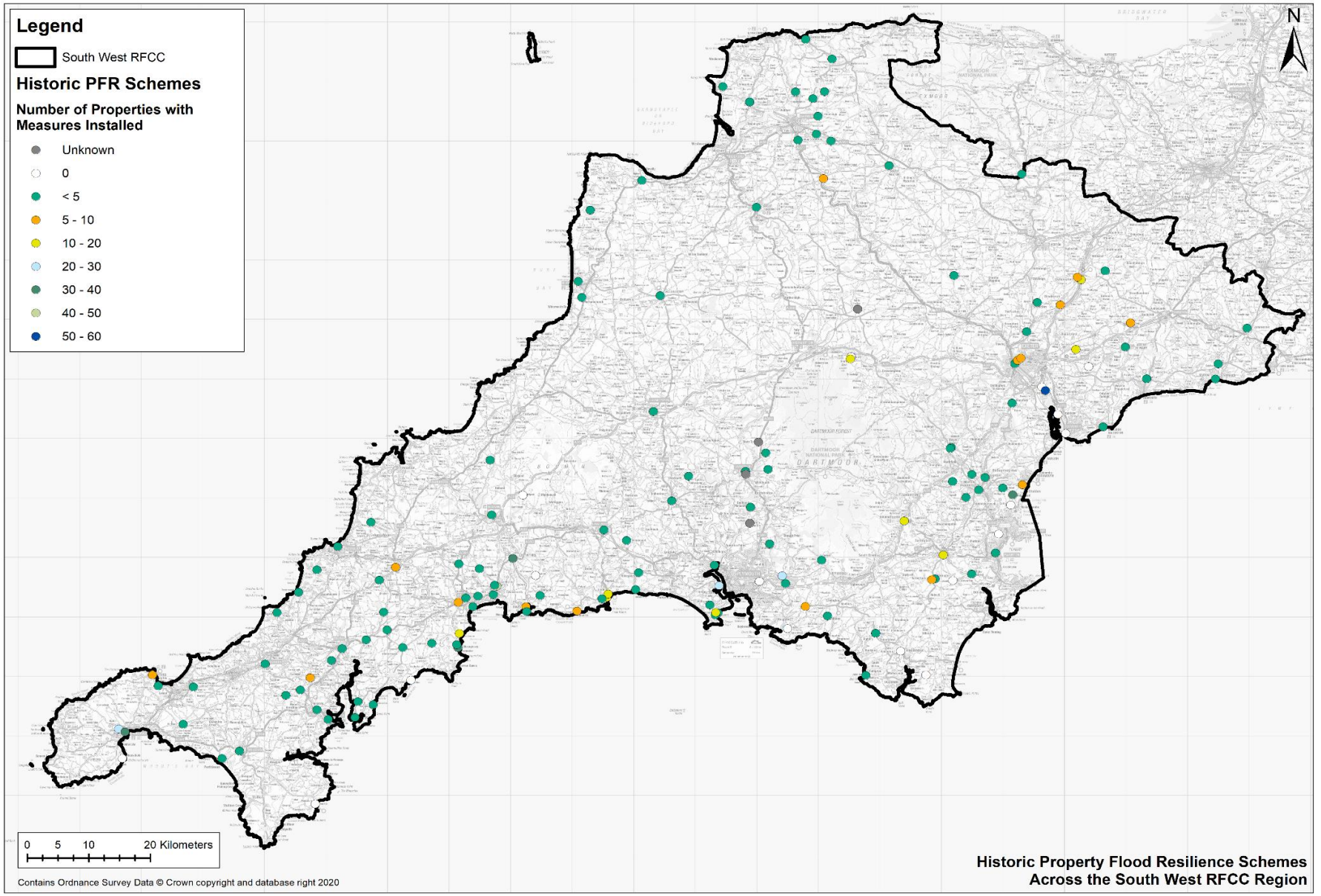
It is important to understand how PFR has previously been delivered across the study area. Data received has been analysed to understand the geographical spread of previously completed PFR schemes and how these schemes were delivered.

To help with assessment and comparative analysis, 16 primary PFR delivery mechanisms have been defined, summarised in Table 3-2. Each describes a delivery route, funding mechanism, timing and type of PFR. Of the 16, there are 8 possible combinations for resistance and 8 possible combinations for resilience.

Table 3-2: The 16 Methods of Property Flood Resilience Delivery

RESISTANCE [PROTECTION MEASURES]				
	Proactive/ Reactive	**Coordinated/ Individual Action**	**Funding Source**	**Example**
1	Proactive	Coordinated	Government Funded	EA & LA Schemes via Framework LA procurement funded by Flood Defence Grant in Aid and/or Local Levy
2	Proactive	Coordinated	Privately Funded	Coordinated community action funded by individuals
3	Proactive	Individual	Government Funded	N/A – This would be included in a community scheme due to cost/benefit constraints
4	Proactive	Individual	Privately Funded	Self-funded individual action
5	Reactive	Coordinated	Government Funded	EA & LA schemes via Framework LA procurement funded by Flood Defence Grant in Aid and/or Local Levy
6	Reactive	Coordinated	Privately Funded	Coordinated community action funded by individuals or insurance settlements
7	Reactive	Individual	Government Funded	Post Flood Government Recovery Grant
8	Reactive	Individual	Privately Funded	Self-funded or insurance funded individual action to repair and protect
RESILIENCE [ADAPTATION MEASURES]				
9	Proactive	Coordinated	Government Funded	N/A - Not cost/beneficial due to high cost of resilience
10	Proactive	Coordinated	Privately Funded	Coordinated community action funded by individuals
11	Proactive	Individual	Government Funded	N/A - Not cost/beneficial due to high cost of resilience
12	Proactive	Individual	Privately Funded	Self-funded individual action
13	Reactive	Coordinated	Government funded	A post-flood recovery grant used towards PFR measures in tandem with insurance.
14	Reactive	Coordinated	Privately Funded	Coordinated community action funded by individuals or as part of insurance
15	Reactive	Individual	Government Funded	Post flood recovery grant towards resilient adaptation – e.g. 2015/16 Storm Desmond PFR Recovery Grant and 2014 Repair & Renew Grant
16	Reactive	Individual	Privately Funded	Self-funded or insurance funded individual action to repair and protect

Figure 3-1: PFR Scheme Locations across the South West



3.3 Torbay Council

Torbay Council have provided information on two PFR schemes that have previously been completed. The Adelphi Road and Manor Crescent PFR Schemes are both located in Paignton.

3.3.1 Adelphi Road, Paignton

The Adelphi Road Scheme was a reactive Type 5 scheme. The properties protected are adjacent to Torbay Park, which floods during extreme weather events, particularly when the sea defences are overtopped.

In March 2018, during Storm Emma, extensive flooding of Torbay Park occurred. Although no internal flooding of properties occurred during this event, PFR measures were fitted at three properties at flood risk as a result of the flood. Table 3-3 provides additional information on the Adelphi Road Scheme. Flooding of Torbay Park during Storm Emma can be seen in Figure 3-2.

Table 3-3: Torbay Council – Adelphi Road, Paignton

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Surface Water	Residential	3	3	100%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Visit with letter	Very successful	Jan-16	Jul-17	EA / Torbay Council
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Reactive	Independent Surveyor Contractor Install	Resistance	Flood Doors, Airbricks, NRVs, Gate Barriers	Yes

Figure 3-2: Flooding of Torbay Park during Storm Emma

3.3.2 Manor Crescent, Paignton

The Manor Crescent Scheme, which provided PFR to one property, was a proactive Type 1 scheme in Paignton. The Occombe Valley watercourse flows through an open channel within the garden of the property before entering a 500mm culvert under the garage. The watercourse is very reactive to rainfall, and the garden floods regularly.

The property was fitted with flood doors (at the front and rear), airbrick covers, non-return valves (NRVs) and the external brickwork was waterproofed.

In October 2019, the culvert under the garage became blocked, the garden flooded, and the level of the water exceeded the threshold of the front and rear doors. It was reported that internal flooding did not occur during this event as a result of the PFR measures installed.

Table 3-4 provides details of the PFR installation at Manor Crescent.

Table 3-4: Torbay Council – Manor Crescent, Paignton

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial	Residential	1	1	100%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Visit with letter	Very successful	Nov-16	Jul-17	EA / Torbay Council
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Independent Surveyor Contractor Install	Resistance	Flood Doors, Airbricks, NRVs, Waterproof External Walls	Yes

Figure 3-3: Flooding at Manor Crescent

3.3.3 Cockington PFR Scheme, Torquay

There is a small scale proactive Type 1 PFR scheme currently progressing in the village of Cockington, Torquay.

This catchment is reactive to heavy rain and there is a history of flooding from the Cockington Stream. Improvements to the watercourse, the highway drainage and re-profiling of the highway are being implemented. In addition, measures to reduce run-off from pastureland are being considered. This option will leave seven properties in the village at risk of flooding. These properties have therefore been made eligible for PFR. Table 3-5provides additional information on this ongoing scheme.

Table 3-5: Torbay Council – Cockington, Torquay

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial	Residential	7	Scheme Ongoing	Scheme Ongoing
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Door Knocking, Letters	Successful	Aug-19	Scheme Ongoing	Torbay Council & Flood Defence Grant-in-Aid (FDGiA)
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Independent Surveyor Contractor Install	Resistance	Scheme Ongoing	No

*This scheme is currently ongoing, information was last updated in November 2020

3.4 Cornwall Council

Three county-wide PFR schemes have been completed by Cornwall Council (CC) to date. Rather than focussing on individual communities, these PFR scheme have been completed across a wide geographical area and consider a wide range of sources of flood risk.

3.4.1 2011 Cornwall Wide PFR Scheme

The 2011 PFR Scheme provided PFR to properties affected by the November 2010 Mid-Cornwall flood event.

A framework agreement was produced by Cornwall Council and the Environment Agency and signed by the appointed contractor and managing agent.

It is understood that of the 187 surveys that were completed across Cornwall at the start of this project, 155 homeowners progressed through the scheme to have measures installed. Table 3-6 provides additional information on the 2011 reactive Type 5 scheme and Table 3-7 shows the locations of eligible properties and the uptake in each individual location.

Table 3-6: Cornwall Council –2011 Cornwall Wide PFR Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Multiple	Residential	187	155	83%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters, Door Knocking, Community Event	Quite Successful	May-11	Oct-12	EA
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Reactive	Independent Surveyor Contractor Install	Resistance	Flood Doors, Barriers, Gates, Walls, Airbricks, Vent covers, NRVs, Pumps, Wall Sealant, Repointing & Waterproofing	Unknown

Table 3-7: 2011 Cornwall Council PFR Scheme Locations

Locations	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake	Locations	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Charlestown	5	5	100%	St Austell	10	10	100%
Lostwithiel	44	34	77%	St Blazey	53	48	91%
Luxulyan	2	2	100%	Tregony	1	1	100%
Mevagissey & Portmellon	40	34	85%	Coverack	1	0	0%
Par Moor, Boscundle & Tregrehan	9	5	56%	Lerryn	2	0	0%

Locations	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake	Locations	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Pentewan	14	13	93%	Millpool	2	0	0%
Polmassick	3	3	100%	Portloe	1	0	0%

A project appraisal was completed to summarise the scheme and the lessons learnt. Within this report, the number of properties fitted with measures varies slightly to other evidence source, stating that 152 properties were fitted rather than 155.

Key lessons learnt, taken from the project appraisal, are shown in Table 3-8. The scheme was initially scheduled to be completed in March 2012. The scheme was completed, with the exception of one property, in October 2012, 7 months later than scheduled. Completion was delayed for a range of reasons:

- Difficulties contacting homeowners to arrange access for works to be completed.
- Issues with the standard of work from sub-contractors.
- Snagging issues at some properties.
- Delays in final sign off and issuing completion certificates due to snagging issues.

Table 3-8: Lessons Learnt from the 2011 Cornwall Council PFR Scheme

Stage of Scheme	Lessons Learnt
General Lessons Learn	• Community involvement is paramount. Residents need to be fully engaged as part of a scheme rather than having it happen to them. Early engagement with key representatives is important. • Communication between all organisations and the provision of up to date information is key to prevent confusion and waste time. • Importance of keeping an audit trail, not relying to verbal actions/agreements. • Importance of good project management.
Pre-Installation	• More detailed and accurate contract briefs required to avoid pricing uncertainty. • More detailed product specifications should be provided to ensure adequate product performance. • Greater input from procurement on contract documentation/specifications. • Collection of correct property contact details required to reduce delays during communications process • Lack of urgency around completion and timescales with outside contractors – potential requirement for financial penalties for over run of project to be written into future specification. • Dedicated hotline for scheme enquiries required and single point of contact and for dedicated/named individuals to act as conduit for all incoming and outgoing communications. • Possible need for in house trained surveyor/s and need to involve successful contractors in surveying, to ensure survey is correct and feasible. • Level of survey detail and quality expected often not reflected in outputs. Specifications need to be tight enough to not leave too open to interpretation. • Initial problem with quality of surveys. • Ability to identify and manage challenging homeowners. • Hierarchy and consistency of approach to flood mitigation measures – Clear rationale behind choice of products essential to avoid confusion as to products available for particular property (e.g. Listed Buildings). Clear choice for products where upgrade is possible for better visual appeal.

Stage of Scheme	Lessons Learnt
	• Some flexibility with active measures and clear guidance from Defra/EA regarding acceptability in "flashy" catchments. • Consistent approach to inclusion/exclusion in scheme. Guidance from Defra/EA inconsistent (e.g. commercial element changed since start of scheme). Need to clearly show why one property included and another not.
During Installation	• Greater site work monitoring and better spot checking and involvement by Client team/representative to pick up poor and defective work at early stage. • Product quality and appropriateness. Some products provided of lower quality than might have been expected. • Warranties – Level of cover afforded not as good as might be expected. • Version control on all formal documentation to ensure clarity of information. • Consistent and appropriate templates for recoding issues, letters, and for audit purposes. • EA funding stream – Impractical deadlines yet project delivery expectations still high.
Post Installation	• Challenges organising sign off and survey appointments. Homeowners not being available for pre-arranged meetings requiring re-visits, and extra cost. • Clearer process to completion and sign off needed to avoid repeated visits. • Scheme size and resources – Underestimated resources required for scheme and include in FDGiA/ funds. Takes lot longer than expected.

3.4.2 2015 Cornwall Wide PFR Scheme

In 2013, Cornwall Council received Flood and Coastal Risk Management Grant in Aid (FCRMGiA) to install PFR measures at properties across Cornwall that had previously experienced flooding. This proactive Type 1 scheme was completed in two phases:

- Phase 1 - 25 properties surveyed, 20 of which had measures installed.
- Phase 2 - 39 properties surveyed, 29 of which have had measures installed.

However, some conflicting evidence shows that 30 properties have had measures installed.

Table 3-9 provides additional information on the 2015 scheme. Table 3-10 shows the locations of eligible properties and the uptake in each individual location.

Table 3-9: Cornwall Council – 2015 Cornwall Wide PFR Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Multiple	Residential/ Commercial	64	49	77%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters, Door Knocking	Quite Successful	Dec-13	Jun-15	EA
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Contractor and Sub-Contractor Install	Resistance	Flood Barriers, Doors, Gates, Walls, Automatic Airbricks, Airbrick & Vent Covers, NRVs, Wall Sealant, Repointing & Waterproofing	Unknown

Table 3-10: 2015 Cornwall Council PFR Scheme Locations

Locations	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake	Locations	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Heamoor	25	21	84%	Menheniot	1	1	100%
Angarrack	4	2	50%	Relubbus	5	4	80%
Bugle	2	2	100%	Seaton	1	1	100%
Hessen-ford	5	3	60%	St Blazey	1	1	100%
Kingsand	6	5	83%	Fraddon	7	6	86%
Luckett	5	2	40%	Summercourt	2	2	100%

Key lessons learnt, highlighted in the 2015 scheme project appraisal, are shown in Table 3-11.

Table 3-11: Lessons Learnt from the 2015 Cornwall Council PFR Scheme

Stage of Scheme	Lessons Learnt
General Lessons Learn	• More detailed and accurate contract briefs required to avoid pricing uncertainty. • More detailed product specifications should be provided to ensure adequate product performance. • Procurement to provide greater input into initial contract documentation/specifications. • Lack of urgency/completion of timescales with outside contractors. Possible requirement for financial penalties for over run of project to be written into future specification. • Consistent approach to recommendation PFR measures for all properties. Clear rationale behind choice of products required to avoid confusion. • Clear choice for products where upgrade is possible for better visual appeal. • Version control on all formal documentation (schedules, invoicing, action log etc.) is essential to ensure clarity of information. • Community involvement is paramount. Residents need to be fully engaged as part of a scheme rather than having it happen to them. Early engagement with key representatives is important. • There should be a reduction in the delivery team. There was not much need for the Commissioning Manager as this work could be managed by the Project Manager and the Project Executive. There was also no need to have two contractors on the project. • Change in procurement strategy for the selection of main contractor and sub-contractor to improve value for money. • The distance travelled by the sub-contractor delayed the programme. A more local contractor should be used. • Improved tracking document to be used by all parties to ensure a consistent approach.

3.4.3 Repair and Renew Grant Scheme 2014/15

As part of the Repair and Renew Grant Scheme, initiated by the government after extensive flooding across the UK, 173 properties at flood risk across Cornwall were fitted with PFR measures. Cornwall Council, alongside multiple town and parish councils identified properties that were eligible for this reactive Type 5 scheme. The scheme is summarised in Table 3-12 and Table 3-13.

Table 3-12: Cornwall Council – Repair and Renew Grant Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Multiple	Residential/ Commercial	184	174	95%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters, Door Knocking, Community Events	Quite Successful	May-14	Jun-15	Defra
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Reactive	Independent Surveyor Contractor Install	Resistance	Flood Barriers, Doors, Gates, Walls, Automatic Airbricks, Airbrick & Vent Covers, NRVs, Wall Sealant, Repointing & Waterproofing	Unknown

Table 3-13: Repair and Renew Grant Scheme Locations

Locations	Properties with Measures Installed	Locations	Properties with Measures Installed
Bodmin	3	Perranporth	2
Bude	1	Perranwell Station	6
Bugle	1	Polperro	6
Callington	1	Polruan	2
Carbis Bay	1	Ponsanooth	3
Cubert	1	Porthleven	5
East Looe	15	Portscatho	1
Falmouth	2	Probus	1
Fowey	7	Redruth	1
Helston	2	Saltash	2
Kea	1	St Agnes	2
Kingsand	1	St Austell	1
Ladock	1	St Ives	9
Lanteglos-By-Fowey	1	St Just-In-Roseland	1
Launceston	1	St Mawes	2
Liskeard	2	St Mawgan	1
Looe	11	St Tudy	1
Mevagissey	4	Stithians	2
Millbrook	1	Torpoint	26

Locations	Properties with Measures Installed	Locations	Properties with Measures Installed
Newquay	1	Tresillian	1
Par	1	Truro	3
Penryn	1	West Looe	2
Penzance	33	Holsworthy	1

3.4.4 2020 Cornwall PFR Grant Scheme

In November 2020, Cornwall Council initiated a PFR Scheme to provide measures to residential properties across Cornwall. This scheme is still in its early stages, however around 33 properties have initially been identified as eligible. This scheme is being coordinated through the Environment Agency PFR Framework. A Lot 4 Managing Agent has been appointed to manage this project and it is hoped that the scheme will continue into the future, developing into a rolling programme of PFR across the County.

3.5 Devon County Council

Devon County Council (DCC) have been involved in a significant number of PFR Schemes across the county since 2016.

3.5.1 Community Resilience Pathfinder Projects

The Flood Resilience Community Pathfinder Scheme[4] aimed to enable communities at significant or greater risk of flooding to work with key partners and develop innovative local solutions. The project in Devon[5], which involved three LLFAs (Devon County Council, Torbay Council and Plymouth City Council), focused on rapid response catchments where minimal or no advance warning was given for flooding. In total, 24 high risk communities were identified and involved. In five communities, PFR measures were used to increase flood resilience.

The Community Resilience Pathfinder PFR Schemes are proactive (Type 1). Table 3-14 provides additional information on the Flood Resilience Community Pathfinder Scheme and Table 3-15 shows the individual communities included within the scheme and the uptake in each location.

Table 3-14: County Council – Flood Resilience Community Pathfinder Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial & Surface Water	Residential	39	39	100%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Community Event	Very Successful	Nov-14	Mar-15	Defra
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Independent Surveyor Contractor Install	Resistance	Flood Barriers, Doors, Gates, Hydrosacs, NRVs, Automatic Airbricks, Airbrick & Vent Covers, NRVs, Pumps, Wall Sealant, Repointing & Waterproofing	Unknown

Table 3-15: Flood Resilience Community Pathfinder Scheme Locations

Locations	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
North Tawton	4	4	100%
Tavistock	2	2	100%
Milton Combe	7	7	100%
Umberleigh	10	10	100%
Buckfastleigh	16	16	100%

4 Department for Environment, Food and Rural Affairs. October 2015. Flood Resilience Community Pathfinder Evaluation – Final Report

5 Devon County Council. April 2015. Flood Resilience Community Pathfinder Project – Final Report April 2015

3.5.2 Devon PFR Improvements Scheme

The Devon County Council (DCC) PFR Improvements Scheme installed PFR measures at a range of isolated properties across Devon, rather than focussing on specific communities. The DCC PFR Improvements Scheme is a proactive, Type 1 scheme that ran between April 2016 and March 2017.

Table 3-16 provides additional information on the PFR Improvements Schemes and Table 3-17 shows the specific locations included within the scheme and the uptake in each location. A range of different independent surveyors and contractors were involved at each community rather than using consistent surveyors and contractors across the entire scheme.

Table 3-16: Devon County Council – PFR Improvements Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial & Surface Water	Residential	18	18	100%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters	Very Successful	Apr-16	Mar-17	Defra & DCC
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Multiple Independent Surveyors Multiple Contractors Install	Resistance	Flood Barriers, Doors, Gates, NRVs, Automatic Airbricks, Airbrick & Vent Covers, NRVs, Pumps, Wall Sealant, Repointing & Waterproofing	Unknown

Table 3-17: Devon County Council PFR Improvements Scheme Locations

Locations	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake	Locations	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Mary Tavy, Tavistock	1	1	100%	Aveton Gifford	1	1	100%
Torringdon	2	2	100%	Hope Cove	1	1	100%
Crowdy	1	1	100%	Kennerleigh, Crediton	1	1	100%
Combein-teignhead	1	1	100%	Ingsdon, Newton Abbot	1	1	100%
Teigngrace	1	1	100%	Holbeton	1	1	100%
Stoke Gabriel	1	1	100%	Sidford, Sidmouth	1	1	100%
Budleigh Salterton	1	1	100%	Buckland Monachorum Yelverton	1	1	100%
Exeter	2	2	100%	Welcombe, Bideford	1	1	100%

3.5.3 River Yealm PFR Scheme

Devon County Council delivered the River Yealm Scheme between February 2016 and September 2017 on behalf of the Environment Agency.

This proactive Type 1 scheme provided PFR measures to 10 properties in Yealmpton, along Boldventure and Tuckers Close, located on the western bank of the River Yealm. This scheme was funded by the Environment Agency's 2012 Flood Recovery Budget. Table 3-18 provides key information on the River Yealm Scheme.

Table 3-18: Devon County Council –River Yealm Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial & Surface Water	Residential	10	10	100%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Unknown	Very Successful	Feb-16	Sept-17	Defra & Devon County Council
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Independent Surveyor Contractor Install	Resistance	Door & Window Barriers, Flood Doors Toilet Bung, Puddle Pump, NRVs, Vent Covers	Unknown

3.5.4 Victoria Terrace, Ottery St. Mary PFR Scheme

PFR was identified as the preferred option for 5 properties on Mill Street, Ottery St. Mary, after being impacted by surface water flooding on multiple occasions.

As of March 2020, this proactive Type 1 scheme is currently being progressed under Lot 3 of the Environment Agency's PFR Framework, which includes the survey, supply and installation of PFR measures by the same contractor. Table 3-19 provides key information available on the scheme.

Table 3-19: Devon County Council – Victoria Terrace PFR Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Surface Water	Residential	5	Scheme ongoing	Scheme ongoing
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters/Resident Meeting	Very Successful	Jul-19	In Progress	Defra/DCC
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	EA PFR Framework – Lot 3	Resistance	Unknown	No

*This scheme is currently ongoing, information was last updated in November 2020.

3.5.5 Stokeinteignhead Flood Improvement Scheme

Stokeinteignhead is a small village located to the east of Newton Abbot. Several properties experienced fluvial and surface water flooding in 2012 and PFR was identified as the preferred option for 40 at risk properties in the community. This is a reactive Type 5 scheme that is currently ongoing.

Table 3-20 provides additional information on the Stokeinteignhead Flood Improvement Scheme. This scheme is currently in progress.

Table 3-20: Devon County Council – Stokeinteignhead Flood Improvement Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial & Surface Water	Residential	40	Scheme Ongoing	Scheme Ongoing
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Community Event	Very Successful	Jul-19	In Progress	Defra/DCC
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Reactive	EA PFR Framework	Resistance	Unknown	No

*This scheme is currently ongoing, information was last updated in November 2020.

3.5.6 Cullompton Flood Improvement Scheme

There is an ongoing PFR Scheme in Cullompton, providing PFR measures to 18 properties at surface water and fluvial flood risk. This is a proactive Type 1 scheme that is currently ongoing. The scheme is currently being progressed under Lot 3 of the Environment Agency's PFR Framework, which includes the survey, supply and installation of PFR measures. Table 3-21 provides additional information on the Cullompton Flood Improvement Scheme.

Table 3-21: Devon County Council – Cullompton Flood Improvement Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial & Surface Water	Residential	18	Scheme Ongoing	Scheme Ongoing
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters	Very Successful	Oct-19	Ongoing	Defra/DCC
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	EA PFR Framework – Lot 3	Resistance	Unknown	No

*This scheme is currently ongoing, information was last updated in November 2020.

3.5.7 Devon County Council PFR Funding Scheme

The Devon County Council PFR Funding Scheme is an ongoing scheme that has been running since 2016. This scheme covers the entirety of Devon and homeowners meeting specific criteria can apply for grant funding up to £5,000 from Devon County Council. Eligible properties have had initial PFR surveys completed by Council appointed independent flood risk surveyors. Using the recommendations from these surveys, homeowners are then instructed to collect quotations from contractors. Once approved by DCC, PFR measures can be fitted to the properties by the homeowner's appointed contractor.

Although this scheme is largely a proactive and government funded scheme (Type 1), homeowners can top-up the funding where required, if quotations are greater than £5,000. However, in the majority of cases, funding is not topped up and a full suite of measures is not provided.

Up to November 2020, 95 eligible properties have made applications for the grants and have been independently surveyed. Of these properties:

- 57 properties have had PFR measures installed.
- 8 properties have been surveyed but are either not eligible or have opted out of the scheme.
- 31 properties are progressing through the scheme but have not yet had measures installed.

Table 3-22: Devon County Council – PFR Funding Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Multiple	Residential & Commercial	95	57	60%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
None Homeowner Must Apply	Very Successful	Apr-16	Scheme Ongoing	Defra/DCC
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Independent Surveyors Multiple Contractors Install	Resistance	Flood Doors, Barriers, Gates, Walls, NRVs, Drainage Works, Pumps, Automatic Airbricks, Vent & Airbrick Covers, Wall Sealant, Repointing & Waterproofing	Yes (In Some Locations)

*This scheme is currently ongoing, information was last updated in November 2020.

Table 3-23: Devon County Council – PFR Funding Scheme Locations

City /Town	Eligible Properties	Measures Installed	In Progress	Removed/Not Eligible
Averton Gifford, Kingsbridge	1	0	1	0
Axminster	1	1	0	0
Bickleigh	2	2	0	0
Bovey Tracey	1	0	1	0

City /Town	Eligible Properties	Measures Installed	In Progress	Removed/Not Eligible
Braunton	1	1	0	0
Buckfastleigh	1	0	1	0
Buckland Monachorum, Yelverton	1	1	0	0
Budleigh Salterton	1	0	1	0
Colyford, Colyton	1	0	1	0
Combe Martin	8	4	1	3
Cornwood, Ivybridge	2	2	0	0
Croyde	3	3	0	0
Dartmouth	1	0	1	0
Exebridge	5	4	1	0
Feniton, Honiton	4	3	1	0
Goodleigh	1	1	0	0
Higher Clovelly	1	1	0	0
Higher Rocombe, Stokeinteignhead	3	0	3	0
Ingsdon	1	1	0	0
Kennford	4	3	1	0
Kentisbeare	1	1	0	0
Kentisbury	1	1	0	0
Kingsbridge	3	2	0	1
Landkey	2	2	0	0
Loxhore	1	1	0	0
Lympstone	2	0	2	0
Muddiford	3	3	0	0
Newton Abbot	2	1	1	0
Newton Ferrers, Plymouth	1	0	0	1
Peter Tavy, Tavistock	1	1	0	0
Seaton	1	1	0	0
Shaldon	1	1	0	0
Shirwell	1	1	0	0
Sidford, Sidmouth	5	5	0	0
Silverton	2	2	0	0
South Molton	1	1	0	0
South Pool, Kingsbridge	11	0	10	1
South Zeal	1	0	0	1
Stoke Cannon	1	1	0	0
Swimbridge	6	4	2	0
Teignmouth	1	0	1	0
Topsham	1	0	0	1
Totnes	2	1	1	0
Tuckenhay, Totnes	1	0	1	0
Welcombe, Bideford	1	1	0	0

3.6 Exeter City Council

3.6.1 Topsham PFR Scheme

The Topsham PFR Scheme was undertaken between April 2015 and July 2015 to mitigate the tidal flood risk to properties in the town. As a result of this proactive Type 1 scheme, 52 properties were fitted with PFR measures and details can be found in Table 3-24.

Table 3-24: Exeter City Council – Topsham

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Tidal	Residential	55	52	95%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters & Door Knocking	Very Successful	Apr-14	Jul-15	Defra
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Contractor Full Service	Resistance	Flood door, flood barriers, non-return valves, airbricks	No

3.6.2 Old Tiverton Road PFR Scheme

Following flash flooding in October 2014, Exeter City Council received funding from Devon County Council to provide PFR measures to properties along Old Tiverton Road near the centre of Exeter. As a result of this reactive Type 5 scheme, 10 properties were identified as eligible and measures have been installed at all of these properties. Details can be seen in Table 3-25.

Table 3-25: Exeter City Council – Old Tiverton Road

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Surface Water	Residential	10	10	100%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters & Door Knocking	Very Successful	Apr-16	Aug-18	DCC
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Reactive	Independent Surveyor Contractor Install	Resistance	Flood Doors, Airbricks, Silicon Sealing, Re-Routing Roof Drainage	No

3.6.3 Longbrook Street PFR Scheme

Following flash flooding in October 2014, Exeter City Council received funding from Devon County Council to provide PFR measures at 6 properties on Longbrook Street near the centre of the city. This reactive Type 5 scheme is currently ongoing as there are delays associated with obtaining Listed Building Consents for the works. Details of the scheme can be seen in Table 3-26.

Table 3-26: Exeter City Council – Longbrook Street

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Surface Water	Residential	6	Scheme ongoing	Scheme ongoing
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters & Door Knocking	Very Successful	Apr-16	Scheme ongoing	DCC
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Reactive	Independent Surveyor Contractor Install	Resistance	Flood wall and flood gates along property frontages proposed	No

*This scheme is currently ongoing, information was last updated in November 2020.

3.7 East Devon District Council

3.7.1 Feniton Phase 1 Scheme

The Feniton Flood Alleviation Scheme is currently ongoing. This scheme was set up 60 properties in the centre of New Feniton experienced fluvial and surface water flooding in October 2008[6]. As part of the wider scheme, PFR was included for several properties downstream. The PFR element of this scheme was reactive (Type 5). The mitigation measures provided the same standard or protection as the main scheme (1 in 100 year with a 20% climate change allowance). Works included:

- Raising kerbs and re-profiling roads
- Installation of flood walls and flood gates
- Construction of bypass channels around properties
- Downstream channel clearance to improve conveyance.

From the information available on the East Devon District Council website and in the Flood Alleviation Scheme Planning Application, it appears that PFR has been completed at 6 individual properties during Phases 1 and 2 of the wider scheme which is still ongoing as of 2020.

6 East Devon District Council. June 2020. Feniton Flood Alleviation Scheme. https://eastdevon.gov.uk/flooding/flood-alleviation-schemes/feniton-flood-alleviation-scheme/

Table 3-27: East Devon DC – Feniton Flood Alleviation Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial/ Surface Water	Residential	6	6	100%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Unknown	Very Successful	2015 (Phase 1 & 2)	2016 (Phase 1 & 2)	Defra
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Reactive	Unknown	Resistance	Flood Barriers, Flood Walls, Road Re-Profiling, Kerb Raising, Drainage Channels	Unknown

3.7.2 Rockbeare, Axminster PFR

The Rockbeare Scheme was undertaken by East Devon District Council as part of the Defra Property-Level Flood Protection (PLP) Grant Scheme, announced in 2009. Little additional information is available about the scheme, however the Evaluation of the Defra Property-Level Flood Protection Scheme report shows that 17 properties were involved in the scheme.

3.8 West Devon Borough Council and South Hams District Council

3.8.1 South Zeal Property-Level Flood Protection Scheme

In 2009, Defra announced £5.5 million of funding over two years for the Property-Level Flood Protection Scheme, targeting properties in areas known to have a high risk of flooding but with little or no chance of benefiting from community-scale defences. West Devon Borough Council made a successful application under the second round of funding and in 2011 was awarded £11,500 to protect 15 homes within the South Zeal, Okehampton.

In addition to the installation of PFR measures as part of this proactive Type 1 scheme, a community emergency plan was developed. The plan identified the monitoring and alert triggers and sets out particular equipment, roles and tasks that would be necessary during such an event. The community took part in an exercise to test the emergency plan and response. Exercise Watermark (a national flood exercise in 2011) helped to refine the emergency plan further and gave residents a chance to test their PFR measures. The village also hosted a visit from the Government's Flood Minister at that time who reviewed the scheme and formally launched the Property Protection Advisor tool hosted by the National Flood Forum.

Details of the South Zeal scheme can be seen in Table 3-28.

Table 3-28: West Devon Borough Council– South Zeal Flood Protection Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial, surface water, groundwater, sewer	Residential	15	14	93%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Ongoing comms between District Council & Residents Questionnaire	Very Successful	2012	2013	Defra/Devon CC/Parish Council
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Independent Surveys Contractors Install	Resistance	Flood warning system, door barriers, pumps	Exercise Watermark

3.8.2 Mary Tavy

In 2014, a single property was surveyed by JBA Consulting in Mary Tavy, on the western bank of the Cholwell Brook. Door barriers, non-return valves and a portable pump were recommended but it is unknown if measures were ever installed at this property.

3.8.3 Dolvin Road, Tavistock

In 2014, two properties were surveyed by JBA Consulting on Dolvin Road, Tavistock on the banks of the River Tavy. Door barriers, air vent cover, non-return valves and portable pumps were recommended for these properties, but it is unknown if measures were installed as a result of this scheme.

3.8.4 Milton Combe

In 2014, three properties were surveyed by JBA Consulting on the road to the south of Milton Combe, on the banks of the Milton Brook. Door barriers, air vent covers, non-return valves and portables pumps were recommended for these properties, but it is unknown if measures were installed as a result of this scheme.

3.8.5 North Tawton

In 2014, four properties were surveyed by JBA Consulting on Fore Street in North Tawton. Door barriers, air vent covers, non-return valves and portable pumps were recommended for these properties, but it is unknown if measures were installed as a result of this scheme.

3.9 North Devon Council

3.9.1 Braunton

PFR measures were installed at 5 residential properties at high fluvial flood risk in Braunton as part of the 2009 Defra Property-Level Flood Protection Scheme.

3.9.2 Hele

PFR measures were installed at 6 residential properties at high fluvial flood risk in Hele, Ilfracombe as part of the 2009 Defra Property-Level Flood Protection Scheme.

3.10 Teignbridge District Council

3.10.1 East Ogwell

PFR measures were installed at 2 residential properties at high fluvial flood risk in East Ogwell, Newton Abbot as part of the 2009 Defra Property-Level Flood Protection Scheme.

3.10.2 Bovey Tracey

PFR measures were installed at 1 residential property at fluvial and surface water flood risk in Bovey Tracey as part of the 2009 Defra Property-Level Flood Protection Scheme.

3.10.3 Kingsteignton

PFR measures were installed at 1 residential property at fluvial and surface water flood risk in Kingsteignton as part of the 2009 Defra Property-Level Flood Protection Scheme.

3.11 Mid Devon District Council

There are no records of any historic PFR schemes completed by Mid Devon District Council. Mid Devon were contacted to provide baselining information, but no information has been received.

3.12 Torridge District Council

There are no records of any historic PFR schemes completed by Torridge District Council. Torridge were contacted to provide baselining information, but no information has been received.

3.13 Plymouth City Council

Plymouth City Council (PCC) has undertaken two PFR schemes in the past and currently has one scheme ongoing in the city.

3.13.1 Community Resilience Pathfinder Project

The Flood Resilience Community Pathfinder Scheme aimed to enable communities at significant or greater risk of flooding to work with key partners to develop innovative local solutions. In some of these communities, PFR was used to increase flood resilience.

As part of the scheme, PCC delivered two separate PFR schemes in Plympton, Plymouth. One scheme is located along Colebrook Road and one along Longbrook Street. Both are Type 1 proactive schemes.

Table 3-29 provides additional information on the Flood Resilience Community Pathfinder Schemes and Table 3-30 shows the specific locations included within the scheme and the uptake in each location.

Table 3-29: Plymouth City Council – Flood Resilience Community Pathfinder Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial & Surface Water	Residential	Unknown	29	Unknown
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters, Door Knocking, Community Event	Quite Successful	Mar-13	Nov-14	Defra
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Contractor Full Service	Resistance	Door Barriers and Flood Doors	Yes

Table 3-30: Flood Resilience Community Pathfinder Scheme Locations

Locations	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Colebrook Road	Unknown	29	Unknown
Longbrook Street	4	3	75%

3.13.2 Laira Avenue PFR Scheme

There is an ongoing PFR Scheme, providing measures to residential properties affected by surface water flooding along Laira Avenue in eastern Plymouth, details can be seen in Table 3-31.

This proactive Type 1 scheme is currently being delivered through Lot 3 of the Environment Agency PFR Framework, which includes the survey, supply and installation of PFR measures. As of March 2020, 7 of the 13 eligible properties had been surveyed.

Table 3-31: Plymouth City Council – Laira Avenue PFR Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Surface Water	Residential	13*	Scheme Ongoing	Scheme Ongoing
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters, Door Knocking	Quite Successful	Jan-20	Predicted May-20	Defra
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	EA PFR Framework – Lot 3	Resistance	TBC	No

*This scheme is currently ongoing, information was last updated in November 2020.

3.14 Environment Agency – Cornwall Facing

The Environment Agency has been actively involved in supporting the delivery of PFR across Cornwall for a number of years. The organisation occasionally delivers its own PFR schemes, but usually takes a supporting role alongside the LLFAs in the South West. Data has been provided by the EA teams serving Cornwall.

3.14.1 Helebridge Flood Defence Scheme

As part of the Helebridge Flood Defences Scheme, to manage fluvial flood risk from the River Strat and River Neet, three properties were fitted with PFR measures in 2016. As part of this proactive Type 1 Scheme, PFR was installed in combination with earth embankments and flood walls to increase flood resilience.

Table 3-32: Environment Agency – Helebridge Flood Defence Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial	Residential	3	3	100%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Unknown	Unknown	Dec-16	Jan-17	Environment Agency
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Unknown	Resistance	Flood Gates	Unknown

3.14.2 Mousehole Flood Defence Scheme

The Environment Agency is currently undertaking flood improvement works on the Paul Stream in the village of Mousehole. Due to the constraints of the culvert, it is likely that during significant weather events, overland flow will still occur through the village when culvert capacity is exceeded. To mitigate the residual risk of flooding, PFR will also be used.

Where modelling showed residual flood risk from the Paul Stream, 86 properties were deemed eligible for PFR as part of this proactive Type 1 scheme. As of 2020, 36 properties have had initial surveys completed. This scheme has faced significant difficulties around engagement, largely due to the high number of second homes and holiday cottages.

Table 3-33: Environment Agency – Mousehole PFR Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial	Residential	86	Scheme Ongoing	Scheme Ongoing
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Engagement Event, Letter Drop, Door Knocking	Scheme Ongoing	Nov-19	Scheme Ongoing	Environment Agency
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	EA PFR Framework Lot 1	Resistance	Scheme Ongoing	No

*This scheme is currently ongoing, information was last updated in November 2020.

3.15 Environment Agency – Devon Facing

The Environment Agency has been actively involved in supporting the delivery of PFR across Devon for a number of years. The organisation occasionally delivers its own PFR schemes, but usually takes a supporting role alongside the LLFAs in the South West. Data has been provided by the EA teams serving Devon specifically.

3.15.1 Shaldon Back Beach Tidal Scheme

There is a tidal flood risk in the village of Shaldon, east of Newton Abbot. In 2009, 8 properties were provided flood doors to increase flood resilience. This was a proactive Type 1 scheme. Table 3-34 provides key information on the Shaldon Back Beach PFR Scheme.

Table 3-34: Environment Agency – Shaldon Back Beach Tidal Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Tidal	Residential	8	8	100%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters, Door Knocking, Community Event	Very Successful	2009	2009	Defra
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Contractor Full service	Resistance	Flood Doors	No

3.15.2 Aylesbeare Property Flood Resilience

In approximately 2010, the Environment Agency supported East Devon District Council in the delivery of PFR in Aylesbeare. Unfortunately, the number of properties involved in this scheme is unknown. Available summary information can be found in Table 3-35. It is also unknow if this scheme was proactive or reactive.

Table 3-35: Environment Agency – Aylesbeare PFR

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial	Residential	Unknown	Unknown	Unknown
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Door Knocking	Unknown	2010	2010	Unknown
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Unknown	Independent Survey & Contractor Install	Resistance	Flood Doors	Unknown

3.15.3 Bishops Tawton Property Flood Resilience

In approximately 2012, 3 properties in Bishops Tawton, south of Barnstaple, were installed with PFR measures to reduce the risk from fluvial flooding. Table 3-36 provides summary information on the measures installed in Bishops Tawton. It is unknown if this scheme was proactive or reactive.

Table 3-36: Environment Agency – Bishops Tawton PFR

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial	Residential	3	3	100%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Door Knocking	Very Successful	2012	2012	Unknown
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Unknown	Independent Survey & Contractor Install	Resistance	Door Barriers	Unknown

3.15.4 Horden Bridge, Braunton Property Flood Resilience

The village of Braunton, North Devon, has a long history of fluvial flooding associated with the River Caen. In the summer of 2012, the Environment Agency completed a flood defence scheme in Braunton to increase its standard of defence. As part of this Type 5 scheme, 4 properties were provided with PFR. The installation of these measures was managed by the local council within the wider Environment Agency Scheme.

Braunton suffered 2 flood events on 22nd December 2012. The Horden Bridge area experienced property flooding even though PFR measures were in place. The Environment Agency reported that 2 of the properties with measures installed experienced internal flooding during the 2012 flood event. Table 3-37 provides key information on the measures installed.

Table 3-37: Environment Agency – Horden Bridge, Braunton

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial	Residential	4	4	100%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters, Door Knocking, Community Event	Very Successful	2012	2012	Defra
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Reactive	Contractor Full Service	Resistance	Flood Doors	Yes

3.15.5 Harbertonford Property Flood Resilience

The Environment Agency reported that, in approximately 2012 – 2013, PFR was provided for 6 residential properties in Harbertonford where there is a fluvial and surface water flood risk. Summary information has been provided in Table 3-38.

Table 3-38: Environment Agency – Harbertonford PFR

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial & Surface Water	Residential	6	6	100%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Door Knocking	Very Successful	2012 - 2013	2012 - 2013	Unknown
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Unknown	Independent Survey & Contractors Install	Resistance	Door Barriers	Unknown

3.15.6 Pound Lane, Cullompton Property Flood Resilience

In 2016, PFR measures were installed at 10 properties on Pound Lane in Cullompton to reduce the risk of fluvial flooding. Of the 17 properties eligible for the proactive Type 1 scheme, only 10 had PFR measures installed. Table 3-39 provides key information on the measures installed in Cullompton.

Table 3-39: Environment Agency – Pound Lane, Cullompton PFR

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial	Residential	17	10	60%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters, Door Knocking, Community Event	Quite Successful	2016	2016	Defra
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Contractor Full Service	Resistance	Flood Barriers	No

3.15.7 Cawsands Property Flood Resilience

At Cawsands, 36 properties were eligible for PFR due to the fluvial flood risk present. Of these properties, only 15 had measures installed to increase flood resilience. Summary information proactive Type 1 scheme can be found in Table 3-40.

Table 3-40: Environment Agency – Cawsands PFR

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Fluvial	Residential	36	15	40%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters, Door Knocking, Community Event	Partially Successful	2016	2016	Defra
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Contractor Full Service	Resistance	Flood Barriers	No

3.15.8 Totnes Flood Defence Scheme

The Totnes Flood Defence scheme was undertaken to reduce the significant risk of tidal and fluvial flooding in the town. As part of this Type 1 scheme, PFR was installed at 12 residential properties. Table 3-41 summarises the PFR element of the Totnes Flood Defence Scheme.

Table 3-41: Environment Agency – Totnes Flood Defence Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Tidal & Fluvial	Residential	22	12	55%
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Letters, Door Knocking	Quite Successful	2019	2019	Defra
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Contractor Full Service	Resistance	Door Barriers, Flood Doors, Airbricks, Non-Return Valves	No

3.15.9 Exmouth Flood Defence Scheme

The Environment Agency is currently undertaking a tidal flood defence scheme in Exmouth, where three main areas are being protected from tidal flooding. As part of this proactive Type 1 scheme, properties along Camperdown Terrace, Mamhead View and the Esplanade have been identified as benefitting from the installation of PFR as part of the wider scheme.

The following properties have engaged with the PFR Scheme and have had initial surveys completed:

- Camperdown Terrace – Of the 20 eligible properties, 15 properties have been surveyed and measure recommended.
- Mamhead View – Of the 9 eligible properties, all 9 properties have been surveyed and measures recommended.
- The Esplanade – Of the 10 eligible properties, 6 properties have been surveyed and measures recommended

Table 3-42: Environment Agency – Exmouth Flood Defence Scheme

Source of Flood Risk	Residential/ Commercial	Number of Properties Eligible	Number of Properties with Measures Installed	Uptake
Tidal	Residential	39	Scheme Ongoing	Scheme Ongoing
Engagement Methods Used	**Success of Engagement**	**Scheme Start Date**	**Scheme Completion Date**	**Funded by**
Engagement Event Letters	Very Successful	Aug-19	Scheme Ongoing	Defra
Proactive or Reactive?	**Delivery Mechanism**	**Resistance or Resilience Adaptation**	**Types of Measures Installed**	**Has scheme been tested?**
Proactive	Independent Surveyor Contractor Install	Resistance	Scheme Ongoing	No

*This scheme is currently ongoing, information was last updated in November 2020.

3.16 Council of the Isles of Scilly

There are no records of any historic PFR schemes completed on the Isles of Scilly. The Council of the Isles of Scilly (IoS) were contacted to provide baselining information, but no information has been received. A representative from the Isles of Scilly stated that some PFR had been installed on a very small number of properties, but information is very limited.

3.17 South West Water

There are no records of any historic PFR schemes completed by South West Water (SWW). The water company was contacted to provide baselining information, but no information has been received.

3.18 Summary of PFR Delivery in the South West

The above assessment can be concluded by stating the number of properties that have had PFR delivered in each local authority area and by each Risk Management Authority (RMA), this is shown in Table 3-43.

Table 3-43: Summary of PFR Delivered and Ongoing Across the South West

Risk Management Authority	Number of Schemes Completed	Number of Properties with PFR Installed	Proactive Schemes	Reactive Schemes	Schemes Currently Ongoing
Cornwall Council	3	378	2	1	1
Devon County Council	4	124	4	0	3
Torbay Council	2	4	1	1	1
Plymouth City Council	2	32	2	0	1
Council of the Isle of Scilly	0	0	0	0	0
Exeter City Council	2	62	1	1	1
East Devon District Council	2	23	1	1	0
West Devon Borough Council and South Hams District Council	1	14	1	0	0
North Devon Council	2	11	2	0	0
Teignbridge District Council	3	4	3	0	0
Mid Devon District Council	0	0	0	0	0
Torridge District Council	0	0	0	0	0
Environment Agency – Cornwall	1	3	1	0	1
Environment Agency - Devon	8	68	4	1	1
TOTAL	**30**	**723**	**22**	**5**	**9**

The following summary points can be highlighted from Table 3 43. As of November 2020:

- At least 723 properties have been provided with PFR.
- At least 30 PFR Schemes have been completed across the South West.
- Of the schemes completed, 81% have been proactive schemes (Type 1).
- Of the schemes completed, only 19% have been reactive schemes (Type 5).
- Of the schemes completed, the majority of properties received resistance measures only, with very few receiving any kind of resilient adaptation.
- There are 9 schemes currently ongoing across the study area.

The first Property Flood Resilience funding became available in 2009, 11 years before this dataset was collated. From the data available, it can be deduced that on average, PFR has been installed at c.80 properties per year across the South from all Risk Management Authorities. This does not include data from the 9 schemes that are currently ongoing.

3.19 Limitations of Data Collection

The baseline information from some organisations was only partially complete. Internet searches have helped to identify additional information for some schemes but for others information remains limited. This partially impacts our understanding of delivery mechanisms and how many properties were installed with PFR measures.

In several cases, particularly at the District level, there is evidence of properties at flood risk receiving PFR surveys, but it is unknown if measures were ever installed as a result of this. This is largely due to a lack of follow up audit in earlier PFR schemes.

Although this baselining study gives a good summary of PFR installed as part of formalised Local Authority or Environment Agency schemes, it provides no information on privately funded and installed PFR across the South West. It is extremely difficult to quantify the scale and geographical distribution of privately funded PFR.

4 Blockers to PFR

4.1 Introduction

In order to better understand the blockers to Property Flood Resilience uptake in the South West, the Environment Agency and Lead Local Flood Authorities were asked to summarise their perspective of factors that impact the installation of PFR in the study area. The focus of schemes led by the Risk Management Authorities is on residential properties. These are funded by FDGiA or Local Levy. A separate review is to be undertaken assessing the extent of uptake and any blockers for owners of non-residential and commercial properties.

The blockers have been grouped and a Pathfinder Team response provided for each comment.

4.2 Environment Agency Response

A number of Environment Agency teams (Flood Resilience, Partner and Strategic Overview, PCM) covering Devon and Cornwall were invited to provide views and a range of blockers to PFR uptake, summarised in Table 4-1. This invite was via a questionnaire to circulated from the EA Area Flood Risk Manager for the Devon, Cornwall and Isles of Scilly (DCIoS) Area. It is unknown why, but the teams covering Cornwall did not provide any information.

Table 4-1: Blockers to PFR Uptake – Environment Agency Perspective

	Comment	Pathfinder Team Response
Overview	• "EA don't often progress with PFR schemes, this is usually undertaken by the Lead Local Flood Authorities". • "We often try and keep things simple by directing any PFR to this approach and keeping our projects more focussed on solutions for communities that are more passive".	• This is a comment at-odds with the EA National FCERM Strategy and vision for Risk Management Authorities to mainstream PFR and not in line with the Pathfinder objectives defined by Defra to encourage greater awareness and use of the PFR Framework.
Holiday Lets and Second Homes	• There are issues and concerns around the reliance on the operations of PFR measures by residents, particularly with second homes and holiday lets. • "Many properties that are in small coastal communities have PFR fitted, but it is unclear whose responsibility it is to operate the PFR measures. • There are concerns around second homes, where flood warnings may not be picked up or acted upon if the property is empty for some periods of the year. • Similarly, in holiday lets, flood warnings will not be picked up or acted upon. Those staying in the property may be unaware of the PFR and how it works. • The high number of second homes and holidays lets, and the issues associated with these property types are significant blockers to the effectiveness of PFR.	• Valid concerns, although these shouldn't be viewed as insurmountable and reasons for not progressing a scheme. • Effective engagement strategies, the identification of a 'local champion' and work with the local Parish Council can all help overcome problems of remote ownership. • Development of a community emergency flood plan is vital for the success and legacy of a PFR scheme • Holiday tenants can be easily informed about response and deployment via an Information Pack or signage (similar to a fire evacuation plan)
Passive Solution Preference	• The Environment Agency prefer implementing passive solutions to mitigate flood risk.	

	Comment	Pathfinder Team Response
Lack of Flood Warnings in Rapid Response Catchments	• The majority of the South West is covered by small rapid response catchments. • "At present, we don't offer a flood warning service to the majority of the smaller watercourses due to funding and resourcing in the past. However, that is changing with the Flood Warning Expansion Programme". • "This means that in many of the smaller communities, where PFR may be economically preferable to anything else, we don't have the ability to warn in advance to notify residents to install their PFR. This then means there's a heavy reliance on education and community flood groups". • "Inherently, people won't respond when they need to, or will over-respond and become less willing to deploy due to perceived inconveniences of having boards out when not needed etc."	• There are other means of identifying a suitable trigger for PFR deployment, including weather and rainfall alerts. • The use of passive measures such as flood doors negates this reliance on flood warning for deployment. • Effective PFR is much more than simply product provision, but rather a package which seeks to embed and improve preparedness, including with the development of a local community emergency flood plan.
Heritage Buildings	• Heritage buildings, such as listed buildings and those constructed from materials such as cob, are challenging to protect using PFR. • "quite a few instances have come up with properties in designated landscapes or on listed structures, which then make it very hard to meet the needs of the resident but also the regulator of the building proposals".	• This isn't insurmountable. Early, open and honest consultation with the resident and Listed Buildings Officer can result in sympathetic solutions being provided. • Importance of communication and expectation management in risk reduction; the intention isn't to completely stop flooding
Demographics	• The Environment Agency highlighted that the South West has a predominantly aging populations with concerns that PFR is often impractical for this demographic.	• This implies that in the absence of a traditional flood defence scheme, communities with elderly populations would remain at risk. This appears to be an excuse for not progressing PFR.

The evidence above appears as a list of reasons as to why PFR could not and does not prove to be an effective flood risk management solution in the South West. The comments seem at-odds with the EA National FCERM Strategy and vision for Risk Management Authorities to mainstream PFR and are not in line with the Pathfinder objectives defined by Defra to encourage greater awareness and use of the EA's PFR Framework. Such attitudes within the EA suggest that some have a view that PFR is perhaps not worth the effort, or indeed something that should be done by LLFAs. This is backed-up by evidence that the EA have delivered very little PFR in the South West, compared to many other Areas nationally, including the neighbouring Wessex Area. Yet both areas are characterised by many rural communities and properties at flood risk where capital flood defence schemes can rarely be justified. Changing attitudes and behaviours will be required as efforts to mainstream PFR continue.

The same Environment Agency teams were provided with a questionnaire to better understand the organisations overall perspective of Property Flood Resilience in the South West. The information collected from this additional questionnaire is shown in Table 4-2.

Table 4-2: Blockers to PFR Uptake – Environment Agency Additional Responses

Where a traditional flood engineering scheme cannot be justified for capital expenditure across the Devon and Cornwall Area, what alternatives are EA staff investigating for communities remaining at significant flood risk?
The main types of approaches being taken are: • Slowing the flow in the upper catchment, by applying natural flood management type interventions. • PFR, flood warning service expansion and community engagement for flood awareness and preparedness are also being considered to reduce the potential impacts of flooding.
To what extent has Property Flood Resilience (PFR) been adopted by the Environment Agency across the Devon & Cornwall Area and what are your views of the benefits and constraints.
PFR is being used both as a short term measure to buy time before more complex schemes can be developed and delivered and as part of longer term schemes. For example, in Devon PFR has been used in Totnes as part of a long term solution, as it will in Mousehole, Helston and Exmouth. It has been installed as a shorter term solution in Cawsand and in the Laira area of Plymouth by Plymouth City Council. The view is that PFR is an excellent option to have as part of a flood risk management toolkit. It's an excellent option to manage flood risk to properties along exceedance flow routes, where it is uneconomic to increase channel/culvert capacity. Also, when there are isolated properties at risk. The key constraint is the uptake by property owners and their perception of risk. Also, the type of PFR – there is a huge difference in installing a flood door, which is passive and always works, compared to solutions such as flood boards, which require intervention to make effective. This is particularly the case in Cornwall where typically lead times to flooding are short. If passive PFR can be used they are a great advantage here due to the short duration of flooding, which suits PFR in our view.
What PFR scheme plans are being proposed for the next 6 year programme to contribute to the total of properties better protected?
We are currently building our next 6 year programme and in the ongoing discussions on this PFR does feature, as it does with other risk management authorities. We will have a clear view on our future programme in September 2020.
In your opinion are there any limitations that may impact the delivery and uptake of PFR across the South West (Devon, Cornwall, Isle of Scilly)?
There is certainly appetite to use it within the EA, so that does not feel like a blocker. Limitations to the delivery and uptake are: • Homeowner uptake • Listed buildings and second homes pose a challenge to uptake. • Affordability may limit homeowners' and businesses' uptake. • Depth of flooding and momentum in flood water (e.g. very deep water or coastal wave impacts)
To what extent has the Environment Agency's Property Flood Resilience Framework been used so far across the Devon & Cornwall Area by the Environment Agency and by Local Authorities?
In Cornwall: Mousehole & Helston In Devon: Laira Avenue, Plymouth.

What recommendations would you make for raising awareness of PFR across the South West and of the EA's PFR Framework to increase take-up?

Community engagement is vital for developing customers' understanding and buy-in for PFR options. We believe customers need to understand their flood risk, how it is currently managed and the residual risk, in order to appreciate a remaining need for individuals to also take action to mitigate their local flood risk.
Community engagement needs to consider behaviour change theory e.g. The checklist recommended by Institute for Government's Mindspace report[7]:

- **Messenger**: we are heavily influenced by who communicates information
- **Incentives:** our responses to incentives are shaped by predictable mental shortcuts such as strongly avoiding losses
- **Norms:** we are strongly influenced by what others do
- **Defaults:** we "go with the flow" of pre-set options
- **Salience:** our attention is drawn to what is novel and seems relevant to us
- **Priming:** our acts are often influenced by sub-conscious cues
- **Affect:** our emotional associations can powerfully shape our actions
- **Commitments:** we seek to be consistent with our public promises, and reciprocate acts
- **Ego:** we act in ways that make us feel better about ourselves

In your opinion, who should be responsible for the delivery of PFR?

PFR is a management approach so should be open to all.

What role should the Environment Agency and other Risk Management Authorities in the South West take to support communities after a flood defence scheme or PFR scheme has been delivered?

Our Flood Resilience team is able to provide ongoing support to communities, however resources are limited, so ongoing post scheme support will need to be carefully considered. It would be best, in our view, to use the flood forum group for multiple communities to work together on common issues and this could more realistically be supported by the EA and other Risk Management Authorities.
Post PFR scheme guidance should be available and accessible for customers to pull for themselves too.

7 Cabinet Office. Mindspace – Influencing Behaviour Through Public Policy. https://www.instituteforgovernment.org.uk/sites/default/files/publications/MINDSPACE.pdf

4.3 Lead Local Flood Authority Response

As well as collecting information on blockers to PFR from the Environment Agency, the Lead Local Flood Authorities (LLFAs) across the South West were also asked to provide information on issues faced when implementing PFR. Blockers from the LLFAs perspective are summarised in Table 4-3.

Blockers to PFR have not been provided by Cornwall Council or the Council of the Isles of Scilly. The lack of response is understandable from the Isles of Scilly where little or no PFR has been delivered.

Table 4-3: Blockers to PFR Uptake – Lead Local Flood Authority Perspective

Blocker	Comment	Pathfinder Team Response
Heritage Buildings	• There are a significant number of heritage buildings and areas across the South West. Installing PFR to Listed Buildings or buildings in conservation areas is challenging. • "The type of resilience products need to be selected in accordance with the requirements of the consent. In some cases, it is not possible to deliver the preferred option. This also takes considerable time in gaining the relevant approvals". • "Where properties are listed it is very difficult to agree the proposed flood resilience measures without knowing what would be accepted within a listed building consent application. This can result in excessive delays and costs to the scheme." • Many buildings across the study area are also constructed from materials that are unsuitable for the use of PFR, such as cob. • "Cob walls are not structurally suitable for some PFR measures such as flood barriers. This limits the options for the property and the property owner has to take responsibility for any structural damage caused".	• This isn't insurmountable. Early, open and honest consultation with the resident and Listed Buildings Officer can result in sympathetic solutions being provided.
Engagement with Eligible Properties	• As seen nationally, engagement with property owners can be difficult and time consuming. • "Gaining engagement from and then approval for the PFR measures has been time consuming and, in some cases, quite unproductive". • Engagement can be especially difficult due to the high proportion of second homes and holiday lets in the South West.	• Equally, as seen nationally and locally, there are some excellent examples of early and effective engagement with communities. • Valid concerns, although these shouldn't be viewed as insurmountable and reasons for not progressing a scheme. • Effective engagement strategies, the identification of a 'local champion' and work with the local Parish Council can all help overcome problems of remote ownership. • Holiday tenants can be easily informed about response and deployment via an Information Pack or signage (similar to a fire evacuation plan)

Blocker	Comment	Pathfinder Team Response
Managing Homeowner Expectations and Concerns	• "The property owners can have high expectations of the level of protection being provided and the scale of works to be delivered". • "Agreeing the flood resilience products with property owners can be difficult as there is a limited choice of products which may not be to the liking (colour, material, surface finish, etc) of the property owners." • Current homeowners are often concerned that having PFR installed may lead to property blight and difficulties selling as it highlights the flood risk to the property. • "Even when properties are known to flood the property owners do not wish to have flood reliance measures installed as they consider this will blight their property. In addition, we have had an issue where the resident is happy to have flood resilience measures installed but did not wish the survey to identify that they had been flooded historically".	• Early and effective engagement can overcome such barriers, providing open and honest dialogue.
Funding for PFR and Homeowner Contributions	• Funding PFR can be difficult. If the cost of protecting the property is significant and greater than the grant funding available, homeowner often cannot or will not contribute to the costs so that the full suite of measures can be provided. This can lead to partially protected properties. • "Total cost for some properties can be very high especially for large properties with a lot of ingress routes. Many residents cannot afford the full host of PFR measures that are recommended even with the DCC funding contribution". • "Usually when securing grant in aid funding for flood resilience measures, we are limited to £5k per property. This figure is meant to cover the survey and the installation of the flood resilience measures. Where the cost exceeds £5k the property owner is required to fund the additional costs. Securing this funding contribution from the owner can be difficult and, in some instances, result in a scheme not proceeding." • "Residential preferences exceed anticipated budget, replacing like for like to ensure aesthetics of buildings add to the costs."	• Agreed about the point of Grant funding; this is addressed further in Section 5.3. • "When securing Grant in Aid … we are limited to £5k per property" – this is incorrect and suitable business case preparation reflecting the true cost of PFR (more akin to £7,000 to £9,000 per property) is needed. Many examples exist nationally of where Local Levy and FDGiA funding hasn't capped PFR. • That PFR can be or needs to be delivered for £5,000 is an outdated myth
Early Implementation of the PFR Framework	• "The process that the EA PFR framework takes was initially difficult to understand and implement. The framework document has a lot of information but could be improved by having a clear step by step process outlined for external organisations to use as guidance".	• Agreed entirely. The EA framework is being renewed in 2021 and hopefully improves on this.
Holiday Lets and Second Homes	• "When dealing with rented buildings/holiday homes it can be difficult to arrange surveys and agree proposed works as you are trying to deal with the property owner and the tenant. • "The proposed flood resilience measures must be easy to store and install as the tenant will be different for every storm event. Simple installation instructions must be provided within the property catering for all tenants (disabled, age, fitness, etc)".	• Effective PFR is much more than simply product provision, but rather a package which seeks to embed and improve preparedness, including with the development of a local community emergency flood plan.

Clearly the LLFAs is the South West have embraced PFR more than the EA, having delivered schemes via a number of different delivery methods in the past. Concerns and barriers prevail from these experiences, some of which are valid, but failing to always realise that challenges are presented with all flood alleviation schemes (e.g. permissions, consents) and so PFR is no different.

4.4 Summary of Blockers to PFR

- A similar range of blockers have been raised by both the Environment Agency and the Local Authorities as impacting the uptake of PFR across the South West.
- Many blockers to PFR in the South West are similar to those seen across the UK however, some are much more localised. The difficulties seen with second homes and holiday lets for example is a particular challenge across Devon and Cornwall as a centre for tourism in the UK.
- The quantity of heritage and listed properties is significant in the South West, which can make the installation of PFR more challenging, although accessing the managing agent available via Lot 4 of the EA framework to support Listed Building Consent processes eases this burden. That being said, there has been little use of the EA framework to date, and as of November 2020 only one Lot 4 managing agent appointment.
- There have been a number of difficulties in getting local procurement teams to sign the Deed of Agreement to access the EA framework and as such it has been used to a limited extent in this area of the UK, meaning that valuable feedback from the framework is also limited at this stage.
- Strong engagement with homeowners, businesses and communities has been highlighted as crucial within the PFR process. This ensures that people understand their flood risk, options and the PFR can be used to reduce flood risk, whilst also managing expectations.

5 Commentary

5.1 Baseline Summary Overview

The baseline survey has provided evidence of the use of PFR for residential properties across the South West, delivered by the EA and Local Authorities via a range of delivery routes, dating back to 2010. However, as noted in Section 3.18 above, there was a patchy response from some organisations. To date, 30 PFR schemes are known to have been completed or are in progress across the South West RFCC. Collectively these are known to have provided enhanced flood protection to between 700 and 800 properties across Devon and Cornwall. This does not include non-residential or commercial properties (the subject of a separate review) or the unknown number of properties where PFR measures have been funded and installed privately, which is very difficult to capture and quantify.

The majority of schemes have been completed by the Local Authorities, either as part of the early Defra Pilot schemes or countywide grant schemes. The few schemes completed by the Environment Agency have been part of a wider flood alleviation scheme rather than a standalone PFR scheme. This is in direct contrast with the EA's neighbouring Wessex Area who have led PFR delivery rather than the Local Authorities, having provided PFR to several thousand properties across their Area.

However, what becomes apparent is that delivery to date has been piecemeal and inconsistent, leading to considerable variations of standard and quality. The emerging Code of Practice is founded on the need for raising standards across the industry, and whilst this remains a self-policed voluntary code, it does nevertheless help to guide scheme promoters. Consistent delivery to acceptable standards will meet homeowner and insurer needs, thereby building a body of evidence of successful delivery and outcomes, something that is currently lacking across the industry.

5.2 Procurement

There has been very limited use to date of the current Environment Agency PFR Framework in the South West, despite it being available for use for 2 years. This includes from the EA themselves, perhaps reflecting local attitudes towards PFR, resulting in the very piecemeal nature of delivery to date. Some LLFAs have experienced difficulty in getting their own internal procurement managers to sign the Deed of Agreement for accessing the framework, with others also preferring to continue with their own arrangements for scheme delivery. The result of a lack of clear commitment to PFR from the EA in the South West has been that Local Authorities have tried to establish either local community schemes or county-wide Grant schemes, but these themselves bring residual risks which are highlighted in subsequent sections.

The EA themselves, on schemes such as Exmouth and Mousehole, have adopted the framework using the more favourable option of Lot 1 for independent survey and Lot 2 for product supply and installation.

What is clear, is that where the EA framework has been used by LLFAs, their preferred option has been to use Lot 3 (survey and install). It is understandable why LLFAs might favour Lot 3 as it eases procurement and administration in having to only appoint one contractor, rather than one each for survey and install. However, this is contrary to the best practice established over the last 10 years and a clear requirement of homeowners and insures alike for independent property flood risk surveys by qualified professionals.

There is clear evidence – and always the perception - that a contractor cannot provide an independent flood risk survey when they are equally vested in ensuring commercial gain through the provision of products or from their own product line. This also fails to acknowledge an important role of the independent surveyor in undertaking the post-installation audit (PIA), to make sure the homeowner has been trained in how to deploy, store and maintain the products, as well as verifying that all ingress routes identified at the survey stage have been protected in a manner which is suitable for the person deploying them, the type of property and the nature of risk.

This PIA also serves to verify that there are no outstanding issues for the contractor to address. Best practice evidence would suggest that a contractor undertaking this role would be 'marking their own homework'.

The EA has now confirmed that the new framework to be re-tendered and awarded in 2021, will no longer have a Lot for survey and install.

The Cornwall Council review of their 2015 scheme stated that there was a concern over the distance that the contractor had to travel, and that more local contactors should be used in future. This isn't necessarily the case, and whilst there's a need to consider wider environmental targets, the Climate Emergency and localism, this needs to be balanced with the importance of raising PFR standards across the industry. For example, the choice of a local South West contractor (who perhaps doesn't provide the correct product range, or KiteMarked products), should not be preferential to a national contractor with the appropriate product choices available. The EA's national PFR framework should be adopted by all LLFAs; this will ensure consistency of standard above all else.

5.3 Engagement

Best practice industry guidance, dating back and with clear examples and evidence over 10 years, shows that early, ongoing and effective community engagement will lead to more residents being involved, greater uptake, and enhanced community resilience. Indeed, Cornwall Council highlighted in review of their 2011 scheme that "residents need to be fully engaged as part of a scheme rather than having it happen to them. Early engagement with key representatives is important." This endorses the approach of adopting a community lead who can champion the initiative locally on behalf of the Risk Management Authority who perhaps might not have the same relationships with those in the community. This would also help overcome some of the perceived blockers the EA identified with second and holiday home ownership, where landlords aren't always present.

An excellent example of community engagement is available from the South Zeal scheme where the local Parish linked effectively with the delivery of the PFR scheme, forming a local community flood group and a community flood plan. This resulted in local flood wardens being trained, and PFR community exercises being run for residents to rehearse their deployment. This should be seen as the Gold Standard of engagement and delivery, but often PFR is offered with little or no upfront engagement, other than an introductory cover letter, thereby missing an opportunity to achieve higher uptake, and help embed wider flood preparedness in the community. It should be remembered that PFR is more than just the provision of products, and a focus on the legacy and outcome should commence from outset.

When engaging with a community other demographic considerations are needed, and the EA highlighted a potential barrier to the use of PFR in that many South West communities are characterised by an aging population, for whom PFR may not be the most appropriate solution. This attitude shows an apparent lack of understanding of the range of PFR products available and how, with effective local flood warden schemes, neighbourly support and a community plan can provide support and assistance to those that need it. Furthermore, the inference is that such communities, which perhaps would not be suited to alternative FRM solutions on cost-benefit grounds, would remain at risk (bringing with it even greater challenges for an aging population, and greater demands on emergency services for example).

5.4 How Much Does PFR Really Cost

Reactive Government Grants dating back to the 2014 'Repair and Renew' Grant have provided £5,000 towards PFR. This was based on the first Defra PFR pilot scheme programme from 2009-2011, which saw an average spend of £4,800 per property. However, while many grant schemes have since set a budget cap of £5,000, this figure can sometimes be inadequate to afford full protection to larger properties. It can be helpful as an average guide perhaps – noting the pilot evaluation also provided the average scheme cost - but it should also be noted that recent recovery schemes now include the VAT element as well, so further reducing the comparative figure by 20%. There are two further reasons why the £5,000 figure inappropriate as a maximum cap:

- Rapid and considerable product development and innovation, coupled with the cost of achieving BSI Kitemark standards, has increased product costs in the last decade; and
- The independent review of the 2009-2011 PFR pilot programme identified that in many cases products such as pumps were overlooked

In instances where a Grant of £5,000 is provided for PFR, such as the Devon County Council scheme, the risk remains that **homeowners pick and choose** what they perceive to be the best use of funds, capped at the available limit. This leaves properties only **partially protected and therefore still at risk**, if homeowners are either unable or unwilling to top-up funds privately.

On average, resistance based PFR typically cost closer to £7,000 per property, although of course this will always reflect the dominant property type, as well as the scale of scheme. It should be noted that capping schemes to a maximum of £5,000 including VAT will often be insufficient, leaving property owners with the perception of receiving a complete package of protection, whilst in reality, residual risk remains.

A more equitable approach which provides parity across PFR delivery, is to dispense with a Grant funded approach and instead provide appropriate capital funds for a scheme based on a business case justification.

5.5 Grant Scheme Experiences

Many of the 30 schemes delivered across the South West actually pre-date the current EA PFR Framework, and since Local Authorities could not use the previous EA framework, it has been best endeavours on the part of LLFAs to adopt and apply PFR where it could feasibly help to better protect properties.

For example, in the absence of a nationally available framework and access to approved suppliers, Devon County Council launched a county-wide grant-based scheme in 2017. Unlike national grant schemes, such as the Flood Recovery Grant, Devon County Council has coordinated the flood risk assessment survey phase, to provide consistency and standards.

This scheme has seen 95 applicants from across the county be provided with a free flood risk assessment survey, with 57 (60%) progressing to install measures. It therefore remains that 40% of applicants have had the benefit of a flood risk assessment survey but haven't progressed to having measures installed.

One possible reason for this is the lack of support homeowners have in selecting and appointing an appropriate product supplier and installer. Despite there being a coordinated approach for the survey, the homeowner is then left to access the open market themselves and are in an unenviable position being responsible for appointing their own product supplier and installer. Residents are directed to the National Flood Forum's Blue Pages Directory which is an unregulated market-place of product suppliers, many promoting non-Kitemarked products. However, there is now a nationally available framework to which Devon County Council are signed up, and this could serve as a shortlist of recognised suppliers to at least provide some degree of quality standards.

With little or no technical awareness, homeowners could easily appoint a contractor who has limited experience in PFR delivery. This, and in the absence of support from a managing agent (now available via Lot 4 of the EA framework since 2018), may leave them vulnerable to poor workmanship. The independent post-installation audit does go some way to mitigate this risk, although there are examples of homeowners being unsatisfied with their appointed contractor and legal recourse commencing.

Many residents have opted for regionally based suppliers, whilst some have appointed local tradesmen. There have been some excellent examples of PFR delivery on this scheme, including the following feedback.

"It has to be a good thing to be prepared. Apart from anything else it provides a level of peace of mind." ***Kelvin in Kennford***

"I now feel more confident that the property is protected to the best of our ability and I don't feel so nervous during periods of heavy and persistent rainfall. While there will always be some degree of risk, I feel the work done will provide excellent first and second level defence. I would encourage anyone in a flood risk zone to take advantage of this… the process is very simple, the products are excellent, and the result will definitely enhance the protection of your property." ***Steven in Croyde***

As with other grant schemes, £5,000 (including the cost of the survey) is made available to the homeowner to fund measures, with the option of private top-up should quotations for measures exceed this. Another unintended pitfall is that no resident to date has self-funded additional measures over and above the grant funding available. This means they often target the measures at the most vulnerable entry points of the property, leaving parts of the property entirely unprotected. Whilst many properties now have increased protection and peace of mind, it therefore remains that many properties benefit from only partial protection and remain at flood risk.

It is recognised that Devon County Council adopted best endeavours in establishing the grant scheme back in 2017, however the approach is based purely on resident application, and as such does nothing to address flood risk across a community. A piecemeal approach such as this attracts inefficiencies in a number of ways compared to community schemes:

- Travel – the appointed surveyor is at the behest of the applications received, and as such is required to travel far and wide to individual properties across the county. The same can be said for a contractor, having to respond to ad-hoc requests for quotes as and when residents reach that stage.
- Adjoining properties – flood risk assessment surveys identify flood risks to and from adjoining properties, but there is no requirement that PFR at any neighbouring property be mandated. This can leave properties vulnerable to flooding through party walls.
- Aftercare and legacy – PFR is so much more than simply the provision of products and is inherently linked to homeowner and community preparedness. Being delivered on a case by case property basis doesn't permit the development of community emergency flood plans, flood warning, exercises and flood warden schemes.
- Engagement – community-based schemes can benefit from effective up-front engagement with those eligible at-risk properties. However a county-wide grant scheme such as this sees only a handful of the properties at risk and eligible actually find out about and apply for the scheme.

5.6 Health and Safety Management

Property Flood Resilience is a vital component of flood risk management in the UK, and as such careful management of Health and Safety risk is needed, as with any other flood alleviation scheme. The works undertaken at a property will need to comply with the Construction (Design and Management) Regulations 2015 (CDM Regs). These regulations identify the roles and responsibilities detailed in Table 5-1.

Table 5-1: CDM Roles and Responsibilities

CDM Duty Holder	Duties
Client (commercial) - Organisations or individuals for whom a construction project is carried out that is done as part of a business.	Make suitable arrangements for managing a project, including making sure: • Other duty holders are appointed as appropriate • Sufficient time and resources are allocated Make sure: • Relevant information is prepared and provided to other duty holders • The principal designer and principal contractor carry out their duties • Welfare facilities are provided
Client (domestic) – people who have construction work carried out on their own home	Though in scope of CDM 2015, their client duties are normally transferred to: • The contractor for single contractor projects • The principal contractor for projects with more than one contractor However, the domestic client can instead choose to have a written agreement with the principal designer to carry out the client duties.
Designers - Organisations or individuals who as part of a business, prepare or modify designs for a building, product or system relating to construction work.	When preparing or modifying designs, eliminate, reduce or control foreseeable risks that may arise during: • Construction • The maintenance and use of a building once it is built Provide information to other members of the project team to help them fulfil their duties.
Principal designers - Designers appointed by the client in projects involving more than one contractor. They can be an organisation or an individual with sufficient knowledge, experience and ability to carry out the role.	Plan, manage, monitor and coordinate health and safety in the pre-construction phase of a project. This includes: • Identifying, eliminating or controlling foreseeable risks • Ensuring designers carry out their duties Prepare and provide relevant information to other duty holders. Liaise with the principal contractor to help in the planning, management, monitoring and coordination of the construction phase.
Principal contractors – Contractors appointed by the client to coordinate the construction phase of a project where it involves more than one contractor.	Plan, manage, monitor and coordinate health and safety in the construction phase of a project. This includes: • Liaising with the client and principal designer • Preparing the construction phase plan • Organising cooperation between contractors and coordinating their work Make sure: • Suitable site inductions are provided • Reasonable steps are taken to prevent unauthorised access • Workers are consulted and engaged in securing their health and safety • Welfare facilities are provided
Contractors – Those who carry out the actual construction work, contractors can be an individual or a company.	Plan manage and monitor construction work under their control, so it is carried out without risks to health and safety. For projects involving more than one contractor, coordinate their activities with others in the project team – in particular, comply with directions given to them by the principal designer or principal contractor. For single contractor projects, prepare a construction phase plan.

Industry guidance dictates that the Designer role is shared between the independent flood risk assessor, and the contractor. This split role recognises the phasing of responsibility, with the independent flood risk assessor responsible for conceptual design, scoping the outline options, with the contractor responsible for product selection and detailed design.

Another unintended consequence of grant schemes is that the homeowner becomes client under the CDM Regs. The homeowner can choose to transfer their duties as the client to the appointed contractor, but this is yet another layer of added confusion and complexity.

There are many wider Health and Safety related hazards associated with PFR. For example, in instances in which surveys are undertaken by a contractor, who isn't trained or qualified to make an assessment of flood risk sources and pathways, it is possible they may not fully appreciate the local flood risks. As a consequence, residual risks may remain after PFR delivery. Again, this endorses a move away from the 'survey and install' approach.

Furthermore, surveys often identify the need for management and control of a number of hazards, or wider consenting needs, such as:

- Structural stability
- Suitability (related to depth and duration)
- Gas Safety
- Landfill and radon gas
- Electrical safety
- Hostile site management
- Listed Building and Conservation Area restrictions

For example, the Devon County Council county-wide scheme has adopted independent surveys, which provides assurance and consistency, although have then stepped away from any direct contractor involvement. Residents are then left fending for themselves, managing some of the many risks, consents and permissions highlighted.

5.7 To Resist or Adapt?

Unsurprisingly, given the considerable higher costs involved, schemes in the South West have almost exclusively focused on the installation of resistance measures with minimal resilient adaptation work being completed to date. However, it is unknown how many properties from the various Defra funded Grant schemes (e.g. Flood Resilience Grant, Repair and Renew) have directed funding towards internal adaptation.

As noted in Section 2.2.8, the real cost of resilient adaptation far outweighs that of resistance. Not only is the cost off-putting for many homeowners, but the clear preference further identified through National Flood Forum research is that people simply want to keep flood water out of their homes. Traditionally Risk Management Authorities do not fund resilient adaptation works inside a property, and despite there being some excellent examples of what measures people can take, the current H. M. Treasury cost benefit rules prevent this more costly intervention. While resistance works on average typically cost £7,000, full resilient adaptation can be tens of thousands of pounds more. The best opportunity for a homeowner to introduce such measures is immediately after a flood as part of a build back better strategy when the property is being refurbished, but otherwise small-scale interventions (like rising butt hinges) will have little benefit alone.

5.8 Mainstreaming PFR – Who's Responsibility is it Anyway?

The data collected for this Pathfinder report shows only 723 properties have had PFR installed across Cornwall, Devon and the Isles of Scilly in the last 10 years. This despite the large numbers that remain at flood risk and continue to suffer flooding: over 300 properties for example are known to have flooded in Cornwall alone between November 2019 and October 2020. At an average of only c80 properties receiving PFR each year over the past decade, this clearly shows the potential to realise the benefits and enable PFR the market penetration it can achieve in managing and reducing risk. Piecemeal delivery and an apparent lack of willingness to embrace PFR to date has served to limit take-up and addressing these barriers provides the opportunity now to mainstream PFR.

The EA feedback gave an insight into perceived barriers, including the time taken to deliver a scheme, difficulties of engagement and challenges over home ownership. However, each of the many barriers identified can be easily overcome, as the experiences of the neighbouring EA Wessex Area highlight, where PFR has been successfully delivered to hundreds of properties over past 10 years. The National FCERM Strategy makes the commitment for Risk Management Authorities to mainstream PFR while a renewed PFR Framework is now planned for summer 2021, actions that will further help overcome the barriers to take-up.

The data collected in this baseline survey also highlights another challenge, namely a clear inequity and lottery over how people receive and benefit from PFR. Some have measures fully funded, others in neighbouring authorities have funds capped leaving them exposed and at residual risk, while others are left to fund and provide PFR for themselves. Furthermore, this residual risk adds worry and anxiety to people who've likely already suffered the trauma of flooding and who perhaps can't afford to privately 'top-up' measures. There remains no clear justification as to why some homeowners are expected to pay themselves and others aren't, and Risk Management Authorities need to carefully review their delivery and funding decisions.

The challenge is therefore to mainstream PFR, equitably, such that Government and insurance industry requirements of seeing widespread uptake of PFR by 2039 when FloodRe ends can be achieved. At the current rate in the South West, of only c80 properties per year, it can be estimated that by 2039 only a further 1,520 properties would have benefitted from PFR.

A major step-change is therefore required, both in delivery and attitude, should the national target of 200,000 properties protected from future flood risk be achieved. Government targets for the number of properties being protected, and drivers such as climate change, will see risk management authorities using PFR more proactively, considered alongside more traditional flood protection measures. As part of project appraisal, scheme managers should consider the financial and technical viability of traditional engineered schemes, as well as temporary barriers and PFR. The provision of a nationally available procurement framework will also see PFR being mainstreamed as an effective flood protection solution and increase the frequency with which it is applied proactively to manage risk now and in the future.

6 Future PFR Opportunities in the South West

6.1 Devon County Council

Devon County Council has identified three communities that may benefit from the installation of PFR in the future, detailed in Table 6-1. This is mainly because at each location, the costs associated with a traditional flood risk management scheme outweigh the benefits due to the small numbers of properties at risk. Furthermore it is anticipated that the current county-wide PFR grant scheme will continue. The FRCM 6-year draft programme currently indicates a further 120 properties anticipated to be delivered over this period (presumed at an average of 20 properties per year).

Table 6-1: Future PFR Opportunity Locations – Devon County Council

Location of Potential Schemes	Source of Flood Risk	Potential Number of Eligible Properties	Proactive/ Reactive	Reasons for Suitability
Collaton Raleigh	Fluvial	15	Proactive	• There is a history of flooding in this community. • Low number of properties at risk. • Highways and railway networks restrict flows but work on this infrastructure would be extremely costly to complete compared to the low number of properties at risk. • Likely to use a combination of PFR and Natural Flood Management in this community.
Coombeinteignhead	Fluvial	12	Proactive	• There is a history of flooding in this community. • Flashy catchment in terms of flood risk. • Low number of properties at risk. • This community has been investigated previously but option to replace culvert in rear gardens is not feasible and too expensive.
Broadhempston	Surface Water	20	Proactive	• There is a history of flooding in this community. • Low number of properties at risk. • Surface water where the highway drainage network cannot cope. • Outlet to the system restrictive so may also require upgrading.

6.2 Cornwall Council

Cornwall Council has provided a database of individual properties across the county where the installation of PFR could be beneficial to reduce flood risk from a range of sources. It is unknown whether these double-count those listed in the FCRM 6-year programme, which indicates 180 over this period, but for the avoidance of doubt it has been assumed that these are separate.

Table 6-2 shows that at least 141 properties across Cornwall have been identified as potentially eligible for PFR.

Table 6-2: Future PFR Opportunity Locations – Cornwall Council

Location	Residential Properties at Risk	Source of Flood Risk
Trenear	5	Unknown
Redruth	1	Fluvial
Bude	2	Unknown
Callington	1	Fluvial
Cawsand	10	Surface Water, Fluvial
Constantine	1	Surface Water Highways
Coverack	3	Surface Water
Falmouth	5	Surface Water, Tidal
Gunnislake	8	Unknown
Hayle	15	Surface Water, Fluvial, Tidal
Innis Downs	1	Surface Water
Menheniot	2	Surface Water, Fluvial
Millbrook, Torpoint	1	Surface Water, Fluvial
Newquay	4	Surface Water, Fluvial
Par	3	Surface Water, Fluvial
Penryn	20	Tidal
Penzance	13	Fluvial
Perranporth	-	Unknown
Perranwell Station	7	Fluvial
Pillaton	-	Surface Water, Fluvial
Polperro	2	Fluvial
Portreath	21	Unknown
Roscroggan, Camborne	1	Surface Water, Fluvial
Sithney, Helston	2	Surface Water, Fluvial
Saltash	2	Fluvial, Surface Water, Groundwater
St Neot	1	Surface Water, Fluvial
St. Levan	1	Surface Water
St. Mabyn	2	Fluvial
Torpoint	1	Unknown
Truro	6	Fluvial

6.3 Plymouth City Council

Plymouth City Council has identified one location in the city, shown in Table 6-3, where PFR may be suitable to reduce flood risk. Longbrook Street in Plympton has a history of flooding and three properties may benefit from PFR.

Table 6-3: Future PFR Opportunity Locations – Plymouth City Council

Location of Potential Schemes	Source of Flood Risk	Potential Number of Eligible Properties	Proactive/ Reactive	Reasons for Suitability
Longbrook Street	Fluvial & Surface Water	3	Proactive	• There is a history of flooding in this community. • The upcoming scheme will reduce flood risk to 3 properties.

6.4 Torbay Council

Representatives from Torbay Council have not identified any future PFR opportunities at this time.

6.5 Exeter City Council

Exeter City Council has identified Taddiforde, located in north Exeter, as a location that could potentially benefit from the installation of PFR. Details of the Taddiforde scheme are shown in Table 6-4.

Table 6-4: Future PFR Opportunity Locations – Exeter City Council

Location of Potential Schemes	Source of Flood Risk	Potential Number of Eligible Properties	Proactive/ Reactive	Reasons for Suitability
Taddiforde	Fluvial & Surface Water	10 - 15	Proactive	• There is a history of flooding in this community.

6.6 Environment Agency

6.6.1 Environment Agency – Cornwall Facing

The Cornwall locations, shown in Table 6-5, are currently being assessed by the Environment Agency through Initial Assessments. These Initial Assessments seek to understand the sources of current flood risk, future flood risk and the options for managing flood risk.

These assessments are being undertaken with significant input from Cornwall Council, developing a future programme of PFR works across Cornwall to deliver between 2021-27. Despite PFR being considered alongside a range of flood risk management methods, it should be noted that at this stage, the preferred option for managing flood risk in each community has not yet been determined.

Initial Assessments currently focus on flooding from Main Rivers and the Sea and locations where there are existing Environment Agency assets. Flood risk from Ordinary Watercourses and surface water are being assessed by Cornwall Council.

In recent years, there has been an increase in flooding from surface water across Cornwall. There are controls on runoff that relate to pollution but not in terms of flooding. The Environment Agency is seeking to improve the understanding of and evidence behind surface water flooding, aiming to link this to PFR delivery in the future.

Table 6-5: Future PFR Opportunity Locations – Environment Agency (Cornwall)

Location of Potential Schemes	Source of Flood Risk	Potential Number of Eligible Properties	Proactive/ Reactive	Reasons for Suitability
Helston	Primary main river	Unknown	Proactive	Properties at flood risk
Portreath/Bridge	Primary main river	Unknown	Proactive	Properties at flood risk
Hayle	Primary main river	Unknown	Proactive	Properties at flood risk
Wadebridge	Primary main river	Unknown	Proactive	Properties at flood risk
Gilberts Coombe	Primary main river	Unknown	Proactive	Properties at flood risk
Cawsand	Primary main river	Unknown	Proactive	Properties at flood risk
Kingsand	Primary main river	Unknown	Proactive	Properties at flood risk
Millbrook	Primary main river	Unknown	Proactive	Properties at flood risk

6.6.2 Environment Agency – Devon Facing

Three locations have been identified by the Environment Agency as potentially benefitting from PFR to manage flood risk in the future.

Future opportunities for PFR supplied by the Environment Agency are detailed in Table 6-6. Furthermore, the FRCM 6-year programme indicated a scheme for 19 properties in Bayards Cove, Dartmouth.

Table 6-6: Future PFR Opportunity Locations – Environment Agency (Devon)

Location of Potential Schemes	Source of Flood Risk	Potential Number of Eligible Properties	Proactive/ Reactive	Reasons for Suitability
Combeinteignhead	Fluvial	15	Proactive	• Forecast for 2020/21 • Combeinteignhead has experienced a number of significant flood events in the past. In 1993, approximately 15 properties suffered flooding and more recently in November 2012 11 properties internally flooded when the nearby ordinary watercourse flooded
Topsham	Tidal	60	Proactive	• Forecast for 2020/21 • History of tidal flooding
Ilfracombe	Fluvial / Tidal	100 (Combination of residential & commercial)	Proactive	• History of fluvial & tidal flooding • Wildersmouth Beach Defences and the Quay regularly overtopped • Some PFR fitted privately • Possible capital scheme to be developed at Wildersmouth Beach managing tidal overtopping. • Tidal threat along Ilfracombe Quay front and surface water flooding during summer storms.

6.7 Observations Regarding Future Programme

All Risk Management Authorities were consulted to gauge their future programme opportunities for delivering PFR. A total of exactly 700 properties was identified (including from Exeter City Council which isn't an LLFA), including those in the FCRM 6-year programme. Apart from the 319 listed in the FCRM 6-year programme there was no indication from any Risk Management Authority as to the timeframe over which they intend to deliver these schemes, merely that PFR could provide benefit. On the basis that c80 properties per year have been provided with PFR to date across the South West, this programme represents only a 10-11 year timeframe. Equally, if all proposed PFR is delivered within 6 years, then the average number of properties receiving PFR each year would increase from c80 to 117.

The piecemeal nature of this programme, in light of the projections about future flood risk and climate change, means many thousands of properties at risk in communities which are unlikely to ever see or benefit from a costly capital defence scheme, will remain at risk.

7 Concluding Remarks

As noted earlier in Section 2.3.6, one of Defra's goals is to "create a nation more resilient to future flood and coast erosion risk, and specifically they state that they will:

- Further boost uptake of property flood resilience in homes and businesses across the country – including through our new £200 million innovative resilience programme.
- Consult on changes to the Flood Re scheme to encourage greater uptake of Property Flood Resilience among households at high risk flooding across the UK.
- Explore with Flood Re if it can do more to accelerate the uptake of PFR, which could include using the scheme's currently available funding.
- Explore ways to provide greater clarity about the use and effectiveness of property flood resilience measures for homes and businesses at high risk of flooding, including how the benefits can be recorded.
- Review the current approach to flood resilient design to consider how to better ensure quality housing for all, as part of our wider commitment to support the development of high-quality buildings.
- Encourage a faster transition of the marketplace for property flood resilience -related advice, products and incentives.
- Encourage and strengthen the preparedness of key local businesses and key public services in areas of flood risk.

Furthermore, the EA's 2020 FCERM Strategy for England sets out the EA's long term vision of 'a nation ready for, and resilient to, flooding and coastal change – today, tomorrow and to the year 2100'. The strategy makes it clear that Risk Management Authorities will work with partners to "mainstream property flood resilience measures that reduce flood damages and enable faster recovery for local communities".

Without a serious step-change in attitude and delivery behaviour by Risk Management Authorities, PFR will remain marginalised, and where delivered will be piecemeal. If capped Grant-funding continues, properties will in some cases remain only partially protected and with significant residual risk.

This Pathfinder report has identified that current PFR delivery across the South West has been low (at only 80 properties per year), sporadic, and inequitable in that some homeowners have had it fully funded, and others only partially. This approach must change if we are to achieve the aspirations of Defra and the EA as set out above.

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