Property Flood Resilience
2020 update

IMAGE: ENVIRONMENT AGENCY

Stories from homes and businesses who have made adaptations to help them recover more quickly after a flood

MDA Flood Resilience Consultants in partnership with Environment Agency FLOODRE NFU Mutual

Flood risk management is a bit like a Jigsaw puzzle of many pieces, all fitting together to reduce our flood risk. I make no apologies for always focussing on the 'bit in the middle', our homes and businesses. It is our homes and businesses that are devastated by the flood water, with much loved possessions and memories destroyed forever. Whilst putting together this EMag, I've heard that people have been out of their homes for 15 months, or businesses shut for a year or more. I've been told harrowing accounts of people's recovery from being flooded, which without exception, everyone said was worse than the flood itself. Being flooded often leaves a lasting, detrimental effect on the state of the mental health of those who have been through it. A fact that is so often overlooked!

In 2018, I project managed the adaptation of two properties (a community centre and a home) in Cumbria, to make them more resilient to future floods, so if they do flood again, they will be able to get back in sooner and the awful disruption reduced. Having been flooded myself and benefited from my own resilient measures, I was keen to find out what other people had done to make their own homes resilient to future floods. So, I have travelled all over the country to talk to both homeowners and business who have been flooded, to see first-hand what they had done. Hopefully their experiences featured in this EMag will both inform and inspire those newly flooded, when they are thinking about flood resilient/recoverable repair. One size doesn't fit all, so I have included a variety of different property types and different types of interventions. Some large and some small, to hopefully fit all budgets.

Some of the properties featured in this EMag were flooded again in February 2020. I have revisited them to find out how quickly they recovered and heard some amazing stories of positive results! I have also added some new stories about homes and businesses recently flooded and recovering again quickly.

Without exception, I have been incredibly impressed as to how hard community members have worked to help each other during the floods. And, the subsequent work they have continued to do- on a voluntary basis- to reduce risk, manage the risk and support the communities they live it before, during and after floods.

I would like to say a big thank you to all the people who took the time to talk to me about their experiences and also the people who have supported me during the production of this EMag

Mary Dhonau OBE

Flooding can be devastating. The emotional and financial consequences felt by individuals, families and communities can last for a long time. We know that Climate change will make things even worse by increasing the frequency and severity of flooding and putting more homes across the UK at risk.

This is why the country needs to become more resilient to future flooding, so that fewer households have to suffer and recover.

We all have a part to play. From Government Agencies to individual households we all need to work together make our homes, our businesses and our infrastructure more resilient to flooding.

I am delighted to see the second publication of this magazine, which highlights the real value of the practical steps people can take to reduce the impact of flooding on their homes and businesses. Mary Dhonau has been a tireless advocate for flood risk communities and for the benefits of property flood resilient adaptations.

The real-life sorties captured in this magazine are testament to the dramatic difference that resilience adaptation can make to peoples' lives. Not only can the damage caused by flooding be significantly reduced, but the length of time that families are forced out of the home is also reduced and in some cases eliminated entirely!

As Chair of the Property Flood Resilience Roundtable, I will look to build on the success of recent years in promoting property flood resilience. Working with leaders from local communities, businesses and Government I believe that together we can bring about the necessary changes to encourage more people to take action to make their properties flood resilient.

Dermot Kehoe
Chair of the Property Flood Resilience Roundtable

IMAGE: GRAHAM MYNOTT

Once the storm is over you won't remember how you made it through, how you managed to survive. You won't even be sure, in fact, whether the storm is really over. But one thing is certain. When you come out of the storm you won't be the same person who walked in. That's what this storm's all about.

Haruki Murakami, Kafka on the Shore

IMAGE: ROB SHEPHARD

IMAGE: ANDREW BRYSON PHOTOGRAPHY

Resilient adaptation in the home

This section focuses on the home and shows the variety of different interventions people have made to enable their homes to recover more quickly after a flood.

It also includes some tips given by the homeowners. These may help in both the preparation for and recovery from the floods.

Sue in York

Victorian terraced house
Flooded 2000, 2012 & 2015

This property is one of a small terraced row built in 1895. The homeowner has lived here for 26 years and had their first flood (from the local river) in 2000. The family lost a lot of their possessions as they hadn't been raised up above flood level. They were out of their home for 9 months and the insurance claim came to £80k.

A period of 'peace' followed the 2000 flood, but then in 2012 another flood occurred, with water reaching halfway up the kitchen units. This time, the homeowner decided to take advice from a specialist surveyor (who was recommended by their Loss Adjuster) and set about making their home flood resilient. The reason was simple: if ever it became impossible to obtain flood insurance, then 'turning the house around' after flooding now needed to be easily affordable on a modest income. The surveyor was also interested in making the house more environmentally friendly, whilst working with different types of materials to improve its flood resilience.

Concrete floors were installed throughout, replacing the suspended wooden floorboards that had been in all but the kitchen previously. Underfloor heating was also installed below the new surfaces, and then they were finished with limestone slabs.

Top Tip

Water proof and breathable plaster is easy to apply, no specialist training is needed and helps to keep the cost down.

As you can see, this solid wood kitchen fitted in 2012 survived the 2015 flood.

Top Tip

Getting the drying process under way as soon as possible is key to getting back to normality quickly.

Some items have survived one or more floods:

- Painted pine skirting-boards and varnished solid pine doors.
- Walls are finished with waterproof and breathable plaster.

Other resilient measures include:

- Solid pine kitchen cabinets, with removable kickboards and wider-than-normal gaps behind the floor level cabinets – this allows de-humidifiers and/or blowers to circulate air throughout.
- For post-flood cleaning, the homeowner uses Teatree Oil to disinfect/kill fungal spores*.
- French doors are 'Alu-clad' type (aluminium external face) which are resilient, wipe clean and low maintenance.
- Sacrificial chain-store bookcases with sturdy frames are turned on their sides to support other (more valuable) furniture above flood level (then shelves replaced); this method worked well for 2 weeks during a previous flood.
- Items on lowest shelves kept in boxes/ baskets, so easily carried upstairs.
- Non-return-valve (NRV) fitted to outlet from ground floor toilet (previously used a 'toilet bung' but it was forced out by the water pressure).
- Used the government £5k grant to purchase industrial standard dehumidifiers, and also a wet-and-dry vacuum (when floods occur, these can be in short supply, so having your own ready to use is a good idea).

All this proved to be very worthwhile – when the third flood occurred (2015) the cost of all the (minor) repairs/replacements needed came to less than £5k!

Future improvements planned:

- If any wooden elements (e.g. skirtings) need to be replaced after a future flood, PVC will be used.
- Boxed-in pipework, due to concrete floors, was made with (sacrificial) plasterboard. Next flood, intends to replace with wooden tongue-and-groove boarding, with hinges to allow it to 'flip up' and allow cavity to dry out. Could also form another surface for supporting items above (low level) floods.

All the items shown here have survived one or more floods.

- To ensure internal doors can be retained (saving money), 'rising butt' hinges will be installed so that they can be removed and stored safely.
- A fully flood resilient front door is also on the list, should the current one need replacing at any point.

* Scientific research here: J. May, C. H. Chan, A. King, L. Williams, G. L. French, Time–kill studies of tea tree oils on clinical isolates, Journal of Antimicrobial Chemotherapy, Volume 45, Issue 5, May 2000, Pages 639–643, https://doi.org/10.1093/jac/45.5.639

Sacrificial chain-store bookcases with sturdy frames are turned on their sides to support other furniture above flood level.

Claire in York

Victorian terraced house. Flooded 2000, 2012 & 2015

This property is one of a small terraced row built in 1895. The homeowners bought it in 2011 and it hadn't been touched for 30 years, so a lot of work was needed to upgrade it. As they were aware it had flooded in 2000, they employed both an engineering surveyor and a specialist flood surveyor to advise what could be done to make their home flood resilient as part of the overall refurbishment. This proved to be worthwhile, as the river flooded the house just a year later in 2012.

Although the water level was initially predicted to be just 7-10cm (3-4"), it eventually reached 60cm (2') deep in some rooms. A similar depth of flooding followed in 2015, and a 'near-miss' has already occurred in 2019.

Measures taken:

- Solid wood kitchen, easily washed down, and all parts are free-standing so moveable (though very heavy). No carpets are used on ground floor, and the floors are finished either in stone, or solid wood (70 year old pitch pine, as shown in kitchen) with closed cell insulation beneath.

Solid wood kitchen survived the floods.

- All service points (electric, water etc.) are raised above flood level. All walls are finished in lime-plaster (which has already survived the 2015 flood, and just needed washing down).
- A flood wall (which reduces the risk to neighbouring homes as well) has a flood-proof gate for access to the patio area.
- Sump pumps installed in both rooms. Claire prefers pumps with circular floats rather than square floats which tend to jam.
- Additional free-standing pumps also purchased as back-up – these can be dropped into the existing sump cavities via an access hatch.
- Bricks painted externally with flood-resistant coating.
- Non-return valves (NRVs) installed to all ground-floor plumbing connections.
- Door barriers are also used to increase the time available for raising/moving possessions.

If the solid wood floorboards ever need replacing, the homeowner will change all the flooring to concrete.

- Claire also keeps 'A-frames' and trestle tables in the garage, which can be used to raise items above water level when floods are expected, as well as stackable plastic crates and extra large strong carrier bags to carry items upstairs.

Top Tip

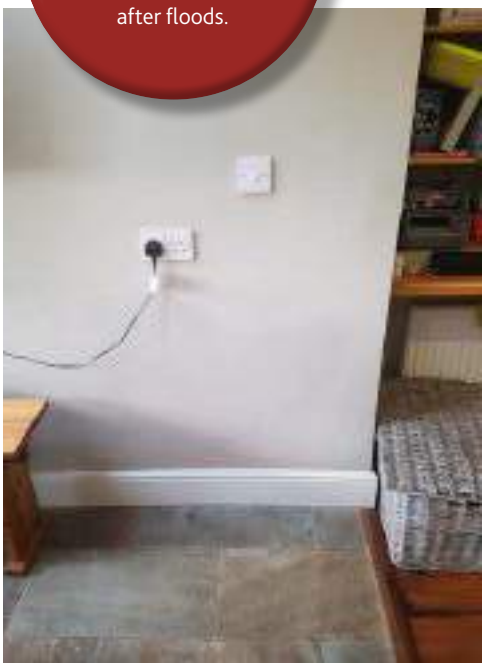
All the work involved took a lot of time to organise and install – so do not underestimate this!

Solid wood kitchen, easily washed down, and all parts are free-standing so moveable.

A flood wall has a flood-proof gate for access to the patio area.

Top Tip

Always buy solid wood furniture if you can, as there is no need to replace this after floods.



All electric service points are raised above flood level.

Door barriers are also used to increase the time available for raising/moving possessions.

NEW FOR 2020

Martin in Leeds

Stone built detached house
Flooded 2006 & 2015

Record breaking floods seem to be happening more frequently in recent years, and the River Aire (Leeds) exceeded its previous recorded maximum by around 73cm (29") on Boxing Day 2015.
As the house had flooded in the past, the homeowners in this case had already received a flood warning and so had put their flood plan into action (deploying barriers, packing overnight bags, collecting up pets and turning off the electricity before evacuating to a friend's home) – but the exceptionally high water level meant that their barriers were over-topped.

As the owners knew the importance of initiating the drying process as quickly as possible, as soon as they were able to get back into the house they used social media to make a plea for help with stripping out the skirtings, lower sections of plasterboard and the flooring. All low-level electrical elements were removed at very early stage resulting in their re-use, following drying out, in the refurbishment. 25 people responded and by the time the loss adjuster arrived next day, all the damaged material had already been successfully removed from the building and the drying process could begin. Extensive "proof" photos were taken for any queries from the loss adjuster.

Garden bench later found stranded high up in a tree.

To guard against such severe flooding in the future (which they accept is more likely due to climate change) the owners chose a combination of resistant and resilient measures. The house came under threat again in February 2020 (three weeks of constant flood warnings) and the measures worked to keep water out of the main part of the house. That which got in under the suspended floors was automatically pumped out efficiently.

The combined works came to approximately £15,000.

Resistance measures included:

- Increased height of the flood barriers from 40cm (16') to 80cm (32").
- Self-closing flood air bricks.
- Repointing all walls with waterproof mortar up to a height of 1m.
- Where solid floors exist, inclusion of edge channels, with rodding and wash-out points, leading to low level sumps. This is work must be carried out by specialist companies, typically those involved with basement conversions.
- All solid floor sections sit on studded membrane allowing water to move beneath the floor and flow to the sumps – known as a "cavity drainage system".
- Sub-floor automatic high-performance skimmer pumps located at low points, with battery back-up system capable of running the pumps for up to 10 hours in the event of a power failure.
- Toilet bung for use in the ground floor toilet as a back up to a non-return valve already fitted in the soil pipe run.

Resilience measures included:

- Plastic flooring and skirtings throughout. Pieces are individually numbered so they can be removed, washed down, and reused.
- Solid floor upper surfaces are coated with a liquid applied damp proof membrane,

Concise written laminated instructions for the installation of flood barriers and other items of resistance.

Top Tip

Intense and immediate drying out really does pay dividends.

with upstands of the same behind skirtings. These form basic bunds confining water in areas which can then be easily swept out or wet-vacuumed.

- Carpeted areas replaced in some utility areas with lino, which can be lifted washed, dried and reused.

Lessons learned and useful tips:

- Act quickly to remove wet items post-flooding. Photograph everything for insurance claim purposes and start drying out as soon as possible.
- Make sure your neighbours know where your keys may be obtained if you are absent. Martin has trained his neighbours how to install his barriers if he is away.
- Have concise written laminated instructions (several copies) for the installation of flood barriers and other items of resistance. Hold one copy in the house and one in the flood equipment store.
- Have a dedicated flood installation tool kit, which is never raided of its contents for use elsewhere!
- For each flood barrier, gather the fittings for that barrier together in a single marked container.
- Write on the flood barriers, where and how they are fitted (indelible marker).
- Keep a wet-vac ready.
- Service all resistance equipment once a year and trial fit all equipment once a year.
- Carefully store all resistance equipment in a protected area out of reach of vermin (they strip off any foam seals for nest material and gnaw on plastics!)
- Hard woods, like oak and ash, are very resilient to getting wet, provided they are quickly removed from damp conditions and dried out. Components comprising skirting boards and window boards in a conservatory were stripped out quickly, dried flat, and all were reused in the refurbishment.

Toilet bung for use in the ground floor toilet and a key safe so neighbours can install barriers if owner is away.

Although barriers were in place in 2015, the river had an unpleasant surprise in store.

Fitting new taller but lightweight barriers.

Sub-floor automatic high-performance skimmer pump.

Channels and membranes with sumps and pumps to remove water, then closed cell insulation and finished with removable plastic flooring.

Katie near Hebden Bridge

Detached 3 storey townhouse Flooded 2015

Katie and her family moved into their detached 3 storey town house, which has a garage underneath the living area, in August 2015.

The house is situated between a river and a canal. Katie was aware of the flood risk and signed up to the Environment Agency Flood Alerts service, but she honestly thought that they would never flood. Katie said November and December has been very wet months, but it didn't worry them. The family were spending Christmas with her Mother when she received a flood alert. Katie and her husband went back home and initially they didn't think things were too bad, but Katie recalled how quickly the water rose up and flooded her ground floor garage where the family had stored lots of belongings, some of which hadn't been unpacked from when they had moved in. Katie said that many memories were lost. The water also went into their hallway.

The water rose far faster than Katie expected and she lost lots of valuable memories that were stored in the garage.

So much lost by the rising water.

Tiling in the hall floor using waterproof adhesive and grout and removed stair carpet.

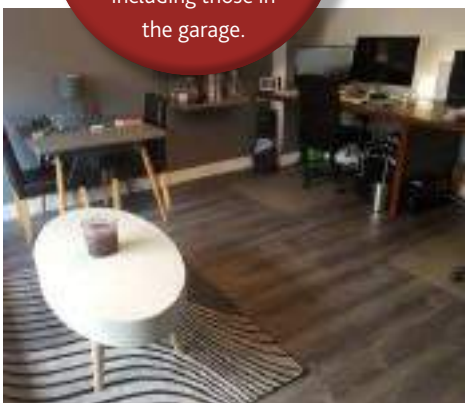
Katie and her husband took advice from a surveyor and they decided to turn a negative into a in positive. They abandoned the garage and gave themselves an extra living room above the flood level, it was built on a suspended floor.

Using their own money, coupled with the Government 5k grant, the couple:

- Bricked where the garage was, leaving a void under the house.
- Put waterproof render onto the bricks.
- Installed self-closing airbricks to the old garage and all around the ground floor.
- Installed non return valves.
- Enlarged the drains to the front of the house.
- Tiled the hall floor using waterproof adhesive and grout.
- Removed the stair carpet and replaced it with a painted staircase to avoid future wet carpet.

Top Tip

Never store items of value in low ground floor cupboards or drawers, including those in the garage.



Katie's new room.

Waterproof render onto the bricks and self-closing airbricks.

Mr & Mrs B in Todmorden

Mid-terraced house Flooded 2012, 2015 & 2020

Mr and Mrs B's mid-terraced home has been flooded twice - in 2012 it was due to surface water flooding, but in 2015 there was a combination of surface water 38cm (15") deep, followed by river flooding from the Calder resulting in nearly two feet of water in the living area.

At the time of the first flood, the couple were insured, and both the remedial work and around 5 months' temporary accommodation were funded from the claim. Unfortunately, some of the work done on that occasion caused problems in the second flood: the electrical sockets and circuit boards were all replaced at ground level (the reason given was the 'like for like' principle) despite requests from them to raise the items above flood height.

After this, they were unable to obtain flood insurance as the Flood Re scheme had not started. They were, however, one of the first households to switch to Flood Re as soon as it was launched, and their premium for flood cover is now just £45.

Solid wood kitchen units are freestanding so can easily be removed.

Home made flood barrier which worked in lesser floods.

Top Tip

Raising the consumer board and re-siting the boiler proved to be an enormous benefit in the next flood, as the owners still had power to the upper levels and heating/ hot water.

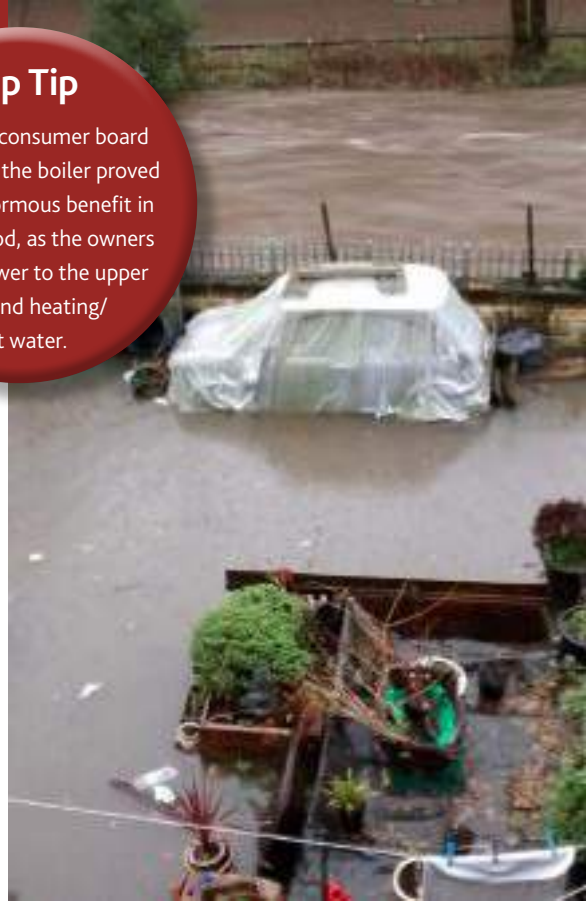
Work done after first flood:

- Flood barriers installed to the front and rear doors.
- Self-closing air bricks to replace the existing ones.
- Owners paid to have the consumer board raised as far up as possible.
- Combination boiler installed into the upstairs bathroom.

Work done after second flood (all grant aided, as no longer insured):

- Sump pump installed to remove groundwater.
- Wall has been constructed at the rear to slow the flow of surface water reaching the back door.
- Flood barriers to gateway
- Concrete garden path removed, and replaced with gravel to allow surface water to be absorbed.
- Kitchen re-plastered and tiled to above the flood level to allow for ease of cleaning and drying out. New units are 'freestanding' so can easily be removed.
- Timbers beneath the wooden floors rooms repaired where the flood water had rotted them (chiefly where the joists go into the walls).

Raised plug sockets and consumer board.



Permeable pathway.

2020 UPDATE

Sadly, the flood barriers on the door and at the side of the garden failed. Mrs B said that the barriers were not kitemarked and were not the best quality and that the barrier to her side garden was not fitted at all well. I have advised the couple to buy kitemarked barriers when they replace them'.

To compound matters, the sump pump was undersized for the amount of water entering her home and was consequently overwhelmed. The free-standing kitchen however, did survive the flood! Mr and Mrs B are now revisiting what to do during reinstatement.

Clare in Todmorden

Stone built terraced house Flooded 2006 & 2015

Clare's family have been flooded twice, in 2006 and 2015. They live in a terrace of old weavers' cottages, which were built with no foundations and are situated on one of the steep hillsides that are typical of the Todmorden area. They had lived there for several years, and had no idea their home was at risk of flooding - although the local river was close by, it is well below them 'in a deep dip' and had never been known to overtop its banks. In the summer of 2006, however, they were shocked to find 'surface water' pouring into their home after a thunderstorm accompanied by torrential rain.

The flood water entered at both the front and rear of the cottage partly caused by drains blocked with builders waste.

Due to the fact that the water was contaminated, the family had to move in with relatives. The problem was compounded by the way the houses had been built – trapping in contaminated water beneath a suspended floor.

After the first flood, Clare bought a flood barrier for the front door, which was successfully used several times after high rainfall. She took the precaution of installing it each time the family went away but they were flooded again in 2015 when water flowed under the walls and up through the floors.

The kitchen worktop is polished concrete and was saved in the flood

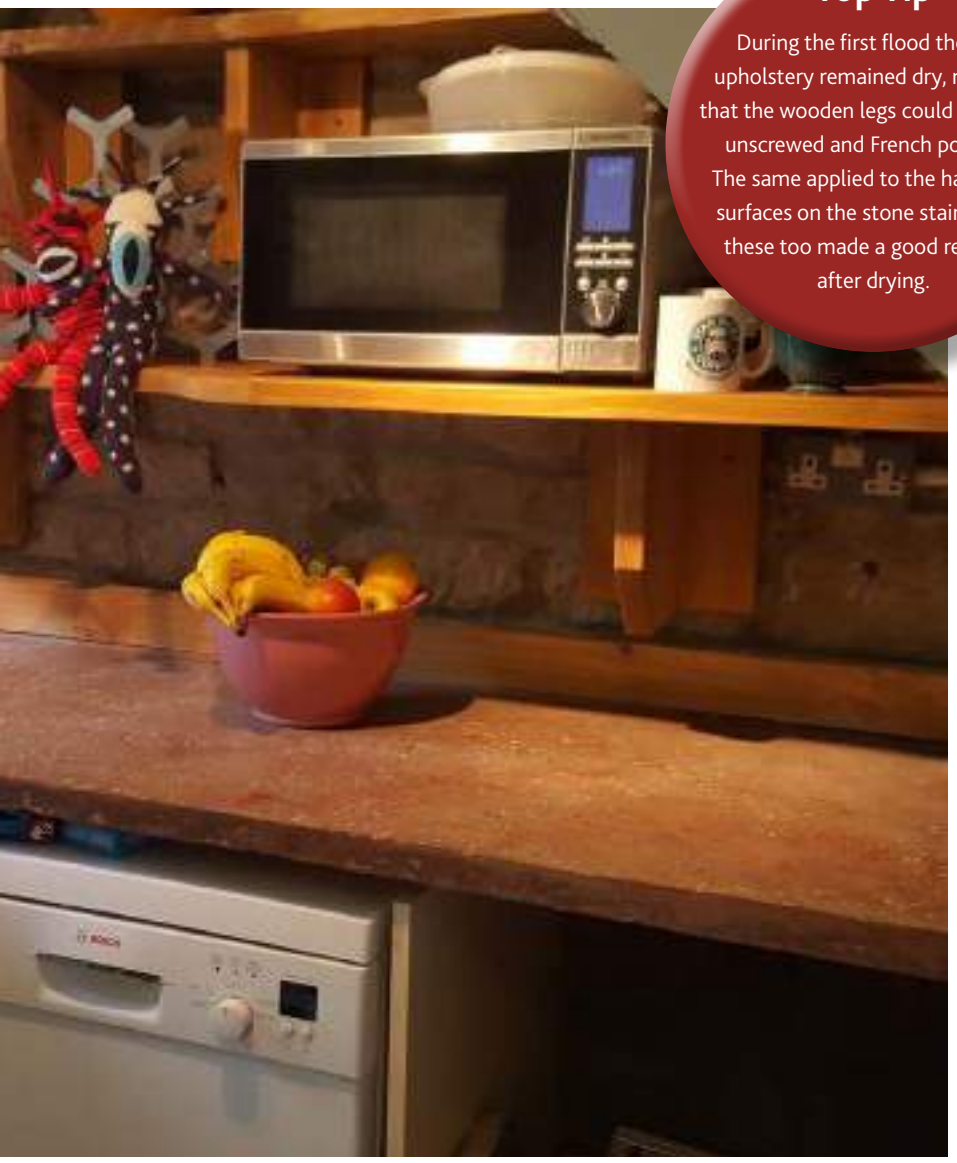
After experiencing poor workmanship by the insurer's contractors after the first flood, Clare decided to take a cash settlement from the insurers and organise the repairs herself. They were fortunate enough to know a local builder with specialist knowledge of flood resilient repair. She had lots of ideas for reducing the risk of future flood damage, and decided to create a 'model house' to demonstrate just what could be done. All the aspects were discussed and agreed in detail, including finishes and colour schemes. In contrast to the 'strip and skip everything' approach often adopted by some insurers, many items were saved, including much of the kitchen and it's concrete worktop (that the same builder had installed five years earlier), along with other furniture that could safely be cleaned and disinfected.

- The rebuild involved excavating and 'tanking' the whole of the ground floor of the cottage. The original stone flags were removed (and sold to a builder's merchant, bringing in additional funds for the refurbishment works).
- A combination of layers of hardcore, a waterproof plastic membrane (which continued up the walls to a metre high) and insulating foam was topped with 10cm (4') of concrete. After being left to 'go off' for a few hours, two different powdered colours were

The rebuild involved excavating and 'tanking' the whole of the ground floor

Top Tip

During the first flood the sofa upholstery remained dry, meaning that the wooden legs could simply be unscrewed and French polished! The same applied to the hardwood surfaces on the stone staircase, as these too made a good recovery after drying.



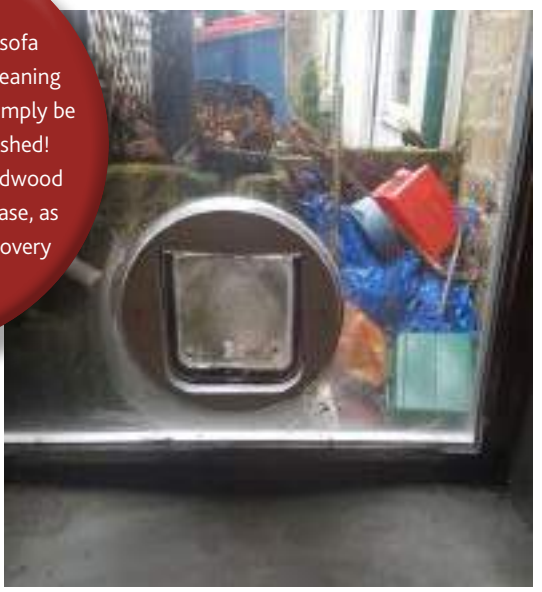
thrown randomly onto the concrete, which was then stamped to give it an antique wood effect pattern. Finally it was sealed to give a gloss finish (and this should last around ten years before needing to be re-sealed).

- The walls were rendered on top of the membrane, using coloured renders which were finally polished to produce a finish resembling marble. Above this, the original stonework of the cottage walls has been left exposed.
- The family's cats were also catered for, with a new cat-flap being created in the window of the utility room, so avoiding any puncturing of the plastic membrane.
- The government £5k grant was used to buy 2 kitemarked flood doors.

An additional and very welcome benefit of the work, is that the family now finds the house much easier to heat, plus the absence of damp means it is also healthier.

The walls were rendered on top of the membrane, using coloured renders

The walls were rendered using coloured renders.



A new cat-flap was created in the window above the height of any potential flood.

2020 UPDATE

Clare reports "This February (2020) I had water on the outside of my house as high, if not higher than the previous two occasions we've been flooded. This was the first time my hometown had flooded this badly since we had had all the work done, so this was its first proper test. The tanking held, the PVC flood doors held and the concrete floor held. Instead of standing in half a foot of water inside I just had a dribble coming in where some wires went through the wall to the meter box outside. It was getting through at a speed at which I could mop it up, so in the end I only had a third of a mop bucket of water instead of a £25,000 insurance claim. I couldn't be happier"!

The floor is concrete, with an antique wood effect pattern, and sealed to give a gloss finish.

Todmorden resident

Mid-terraced house Flooded 2015

This mid-terraced house is known to have flooded three times in the last 20 years. On Boxing Day 2015 water entered through the floor so the homemade flood board, which had kept the water out in lesser floods, was ineffective.

It was discovered that the house had no damp-course, and that a disused drain has not been blocked off correctly! The floor was made of chipboard, laid onto a wooden framework – so as the water rose, the floor (plus tiles and carpets etc) simply floated upwards. The water eventually stopped around ankle depth, and an hour later it had all drained out again. The owners put as much furniture as possible up on blocks and were also able to rescue their piano and store it elsewhere.

Despite the shallow depth and short duration, the dehumidifiers supplied by the insurance company took between 4 and 5 months to dry the house sufficiently for repair work to start. The owners were out of their home for 8 to 9 months as a result. The owners are fortunate enough to have a surveyor and builder in the family, both of whom were able to advise them.

Their reason for making changes was so that, in any future flood, they could "just swill it out!"

Tiling in the ground floor above insulation and underfloor heating.

New wall at front of house with a flood-proof gate

- Solid floor – waterproof membrane, insulation layer, underfloor heating and then concrete. (An extra benefit of this is that the heating bills are now lower).
- Finished floor level is now 15cm (6") higher than previously, and the membrane continues for another 15cm (6") above this. Floor covering is tiles.
- Walls have resilient plaster to same height as the membrane.
- Skirting boards are standard cheap wooden ones that are sacrificial.
- Home-made wooden 'flood board' drop into wooden channels either side of front door.

The government's £5k grant was spent on:

- New wall at front of house made from local stone (direction flood normally approaches) with a flood-proof gate.
- Front garden level raised by 20cm (8"), with paving sloping down to sump.
- Sump created, into which powerful submersible pump can be dropped when flooding commences.
- Front walls of house treated with a waterproofing solution.

2020 UPDATE

Todmorden Resident told me that the flood water reached a good 20cm (8") up the purpose-built wall and flood gate and it held fast. No insurance claim because there was no damage. Job done!

Home-made wooden 'flood board' which was effective in lesser floods .

Sump created, into which powerful submersible pump can be dropped when flooding commences.

Tony in Yalding

Converted oast house
Flooded 4 times

Tony from Yalding has been flooded 4 times, the worst of which was the year 2000. He lives in a converted oast house.

He considers himself very lucky, as the house is on 3 floors, so after the 2000 flood, the family decided to abandon the downstairs and moved their kitchen upstairs.

The ground floor has concrete floors and solid concrete walls and is now used as a utility and storage area. Tony has his washing machine raised on a plinth, he puts any possessions on

Old milk crates raise things off the ground.

an 'A frame' stand and uses stacked crates to store his lawn mower. He is soon to be part of an Environment Agency Property Flood Resilience scheme, which will provide barriers to his doors, a puddle pump and general water proofing maintenance to his exterior walls.

Possessions go on an 'A frame' stand.

Mr C in Yalding

19th century semi-detached house
Flooded 2013

Mr C lives in a 19th century semi-detached house. He was flooded to a depth of 5 feet in 2013.

He decided that because the kitchen was the most expensive item to replace, he would have a Corian plastic kitchen fitted. It appears that the company is no longer in existence, but a quick web search showed that Corian and laminated Aquoline kitchens are still available. He has stone tiled floors that survived the floods and now also has waterproof plaster on the walls.

A Corian plastic kitchen was fitted.

Fixed guttering on the shed to harvest any rainwater into two water butts.

Paul in Hull

Rented property that avoided being flooded

Paul lives in a rented property in Hull.
He didn't flood in 2007. He says he owes this to the fact that his front garden was not paved over with a hard standing but kept as a lawn and therefore was slightly higher up.

Nearby neighbours, who had paved over their gardens, did flood. He also has a long back garden, which has a lawn and trees. He has a large shed from which he has fixed guttering to harvest any rainwater into two water butts and the excess is piped onto the garden. If everyone made some small changes like this, it could make a difference to our overall flood risk.

NEW FOR 2020

Sarah and Paul in Shropshire

Stone built cottage
Flooded on numerous occasions including 2020

Sarah and Paul moved into their cottage 17 years ago. They estimate that they've been flooded on no less than 12 occasions!

Behind the couples' cottage lies the River Severn whilst in front, a small benign looking brook (usually) ambles along. Over the years they have learnt to listen to the Environment Agency Flood Warnings, watch 'Gauge Map' and keep a close eye on local river gauges. The River Severn can go belting past their home at a huge rate and not flood them, but it is when the brook stops flowing, that they know they will flood. Years of experience have taught them when they need to start emptying the garage, as well as moving possessions in the house to a place of safety. They have a minimal amount of furniture, with tiled floors and rugs. When they know they are going to flood, they put all their furniture and possessions onto builders' trestles.

Thanks to the works undertaken the couple did not make an insurance claim after the 2020 floods.

Resilient measures include:

- Tiled floors throughout the ground floor.
- Cement boards (instead of plaster board to the kitchen walls), which are painted over to look like real plaster and which have survived many floods.

A sorry sight in February 2020

Top Tip

If a flood is on its way, they sweep their front garden of any leaves and debris, to stop them from entering their house during the flood event.

- Solid wood kitchen units (both pine and oak)
- Solid Oak varnished skirting boards
- Electric sockets sited higher up the walls
- 3 pumps; one is placed into a sump and 2 (only used in bigger floods of over 35cm) are placed on the floor. Sarah and Paul said these are an essential part of their 'flood tool kit' and are cheap to purchase.

The couple plan to use their £5k flood resilience grant to buy kitemarked flood barriers for both doors, to give them more time to move possessions. As they also flood from underneath, they know that barriers alone won't stop the water from entering their home.

They have an Esse boiler which they plan to replace, as it sometimes leaches kerosene if the flood water gets too deep. To combat this, they empty a large amount of washing up liquid into the flood water and agitate it to disperse the paraffin residue. As the water recedes, they continually use a large rubber edged squeegee mop to stops any silt from hardening on the floor. They then sanitise afterwards.

The large rubber edged squeegee mop

Solid wood kitchen units.

Tiled floors throughout the ground floor.

NEW FOR 2020

John and Michelle in Shropshire

Sandstone house
Flooded 1998, 2000 & 2020

John and Michelle live in rural Shropshire in a Sandstone house, originally built in the 1700's and that had an extension added to the main building around 20 years ago. They have been flooded 4 times; in 1998, 2000 and then twice in February 2020.

The depths of the floods ranged from 35cm to 66cm. When they built the extension, they designed it to allow them to continue to function during a flood and to be able to recover more quickly afterwards. As the water enters their home 'from every which way', they don't try to keep it out. They take flooding in their stride and feel that the occasional flood is a small price to pay for living in such beautiful countryside.

John is now the unofficial flood warden for the village. When there is significant rain fall, both he and Michelle monitor all the gauges in their catchment (including those in Wales) and they regularly visit the local Argae to watch the water levels there. Experience and local knowledge have taught them at exactly what levels they will flood so they keep the community informed and advise as to when to move cars and possessions. It takes John and Michelle about 6 hours to prepare for a flood, but they believe it is time well spent.

Top Tip

If you have an open fireplace, make sure your logs are stored high up, then, as soon as the flood water has gone, you will be able to light a fire immediately to speed up the drying time.

They have taken the following measures:

- All their furniture can be moved off the floor, using a combination of tower scaffold, planks of wood, builders' trestles and blocks. They have chosen a minimalist lifestyle and this fits in well with preparing to be flooded. They move most of their belongings themselves with neighbours helping with heavier white goods.
- The lower oven is easily removed with two screws and all the kitchen drawers can be removed and the units lifted out.
- The new extension has cement rendered walls, which were emulsioned using normal paint. After the 2020 flood, the emulsion didn't suffer at all.
- Slate skirting boards (which were glued onto the walls, using waterproof glue before emulsioning.)
- All doors are solid wood and have been treated with 3 coats of varnish.
- All electric sockets are 1m up the wall.
- Boiler and oil tank are housed above the highest flood level.
- When the flood levels start to drop, they throw a mixture of domestic household products into the flood water and agitate the water regularly, this makes sure that the dirty flood water does not leave any residue.
- As soon as the water is gone, they open all doors and windows, put the heating on and light fires. John said they were back to normal within only 24 hours of the flood water subsiding and that they did not need to make an insurance claim after the 2020 floods!

Oil tank housed and secured above highest flood level.

Furniture raised on tower scaffolding.

The kitchen during the flood of 2020.

The kitchen back to normal within 24 hours of the flood.

Mike in Warwickshire

Detached two-storey house Flooded 2007 & 2015

Mike bought his detached two-storey house in 2003, and it is built right on the banks of the River Stour in Warwickshire, with the river effectively forming part of his garden!

The worst flooding occurred in the summer of 2007, but there have also been less worse floods due to the location. The house already had concrete floors, but the 2007 event saw 1.5m of flood water rising up in the ground-floor rooms. This was later found to be due to a collapsed culvert running underneath the house, which Mike tackled by inserting two non-return valves at the river end of the pipe. This prevents water flowing back through it when the river is in flood, but still allows drainage water to pass through into the river in normal circumstances.

Other measures to keep water out:

- Walls on river-facing side of house have multi-layered waterproofing (brickwork/ aluminium and bitumen).
- Glass barrier with floodgate for access on river-facing side.
- Additional floodgates at side and front of house.

Mike's detached two-storey house is built right on the banks of the River Stour.

Mike has also made his home resilient to flooding in ways he describes as 'quick, effective and simple'. These interventions buy him time to do other work:

- Two sump-pumps in lounge, which operate automatically via float switches.
- Upstairs wiring is on a separate circuit from ground floor, and the board is also sited upstairs.
- A 'flood cupboard' contains all the items essential for raising furniture 30cm (12") off the floor (wooden blocks and crates) plus plastic boxes for storing other contents, and string (to hold the curtains up above flood level).
- Solid oak doors have survived five or six floods already, typically 3 hours on each occasion, and there have been no problems with them.

Future plans:

- Fitted carpets will be replaced if the resistance measures don't work as planned and another flood occurs.
- Electric sockets to be raised (insurers refused to do this after 2007 flood, citing the 'like-for-like' principle of reinstatement).
- Standard plaster (same insurer's insistence) may also need to be replaced.

Walls on river-facing side of house have multi-layered waterproofing.

Top Tip

Keep all the essential flood preparation items you'll need in a hurry in a 'flood cupboard', as a flood could happen anytime of the day or night.

Solid oak doors have survived five or six floods already.

Two sump-pumps in lounge.

The glass barrier with floodgate for access on river-facing side.

A 'flood cupboard' contains all the items essential for raising furniture 30cm (12") off the floor.

The culvert running underneath the house now has two non-return valves.

NEW FOR 2020

Karen in Appleby

17th century, sandstone terraced town house Flooded 2015 & 2020

Karen and her family have lived in their 17th century, sandstone terraced town house in Appleby for 15 years. They were flooded for the first time during Storm Desmond on December 5th, 2015, when the river Eden reached unprecedented levels.

After an insurance claim of over £48,000, which they used to restore their home and possessions and live for eight months in temporary accommodation, the family returned home in August 2016.

Rather than replace like for like, they used the Government grant (provided through Eden District Council), flood grants from Cumbria Community Foundation and Appleby Town Council and plus their own savings, to try and make their home flood resilient. This required a shift in mind set; They gave up trying to keep the flood out of the building and instead worked on managing the flood water inside their home. They could not stop the flooding, but they believed they could manage the situation to make it quicker, cheaper, and easier to get back to normal.

Storms Ciara and Dennis were the first tests of their resilience plans - more than 150mm (6in) of rain fell in the county in 24 hours, with water levels in Appleby within 60cms (2ft) of those seen during Storm Desmond in 2015. For three weeks the family lived with Flood Alerts and Flood Warnings arriving regularly.

What did they do?

- They purchased a modular style steel flood barrier which held back the water for longer to give them more time to get their furniture upstairs or on the dining room table.

The solid wood dining table can be dried out and polished, if flooded, and is useful to stand other furniture on.

- Replaced the wooden floors and carpet with concrete floors and tiles.
- Tanked the walls and floors
- All electrics downstairs were replaced, with new wiring coming downwards, and sockets fitted at a higher level.

The main living room is flood recoverable but still looks beautiful and homely.

Karen and her family are very grateful to the flood volunteers in Appleby who give up their time to ensure the Community is safe. They knock on every door in the flood zone when they have a warning, to ask if they need any help.

What difference did the measures make?

STORM DESMOND 2015

River level 4.75m

Flood level in their home 1.5m

Cost of the resilience work was approx. £15,000

Cost of items lost and damage to property £48,000

STORM CIARA 2020

River level 4.15m

Flood level in their home 5cms

Time to return home 24 hours, after sweeping the water out and sanitising.

Cost of items lost and damage to property £0.00

- They bought a solid wood dining table which could be dried out and polished, if flooded
- Replaced the gas fire with a log burner so they could get heat to dry out the house quicker
- Had the fuse box lifted above flood level
- They replaced their traditional piano (destroyed in 2015) with a lighter electric version that they could lift onto a table
- Replacement BT line installed on the first floor
- Bought a wired telephone which does not rely on the mains electrics
- Reduced the amount of furniture and items stored downstairs
- More kitchen cupboards on the wall with items of lesser value stored in lower cupboards.
- Made a flood plan of what they would do when they receive a flood alert, flood warning, and sounding of the flood siren.

Tiled floors throughout with a larger number of kitchen cupboards on the walls.

David and Tina in Cumbria

Grade 2 listed converted cottage Flooded 2005 & 2015

The cottage is very near to Scandal Beck, which flows into the river Eden. The cottage has now been flooded on 3 occasions, in 2005 and from both Storms 'Desmond' and 'Eva' in 2015.

The flood water comes up very quickly and then recedes quickly also (just a matter of a few hours). The couple feel very fortunate that so far the water has been quite clean. I was struck by their keenness not to throw out anything unnecessarily and subsequently, both their fridge and freezer worked after the flood and once they were cleaned out were used again. Their kitchen is made of elm from a tree on their farm, which had been seasoned for around 10 years before being crafted into a kitchen and shelves. This survived the floods; the kickboards were removed to enable drying out, then washed and refitted. The plaster also survived the flood.

They decided to try to keep the water out of the cottage as best as they can. After taking advice, they built a wall alongside the cottage and up the lane. They dug deep foundations, the wall was built of concrete blocks and finished with stone to make it blend in with the cottage.

Top Tip

If you are unable to lift furniture upstairs, always lift out the bottom drawers and put them on a higher surface.

In addition, they:

- Underpinned and repointed the gable end of the property.
- Installed two sumps outside, into which they put a pump if needed. (These were tested successfully recently when they were threatened with a flood from overland run off from a hill behind the house).
- Flood barriers are fitted behind the gate.
- Made a small bund to slow down the overland run off water.
- Installed a non-return valve on the septic tank.

Internally they have:

- Removed the carpets and have replaced them with tiles, this will enable them to just sweep the flood water out of the doors.
- Put the boiler and freezer on a plinth.

Their kitchen is made of Elm, which came from a tree on their farm, and survived the floods.

Scandal Beck, which flows into the river Eden, can rise dramatically.

Marine ply slot-in barriers put behind the gates in the wall.

2020 UPDATE

David and Tina reported that during the flood in February 2020, their wall and the barriers on the gates were very efficient in keeping the water from the beck out. However, they were also very efficient in keeping the water that was coming off the fields (and into their garden) in! The pumps at the front and back of the house easily dealt with the water in the garden, so that it never actually threatened the house, however, the pumps had to be watched carefully because they tend to cut out when the float gets caught on the wall of the sump. Also, the hoses from the pumps tend to crease on the edge of the sumps and in the high winds of Ciara they were blowing back off the walls.

David and Tina have learned that (i) the defences work well provided they are there to keep an eye on them and (ii) it would be helpful if future storms could be kind enough to avoid arriving in the middle of the night!

Floor is tiled, enabling them to just sweep the flood water out of the doors.

The boiler and freezer raised on a plinth.

Retired couple in York

Georgian cottage (listed building) Flooded multiple times

The interior of this home in York appears unremarkable at first glance – but a multitude of flood resilient measures are actually present.

The owners were well aware of the flood risk when they bought the cottage – not only is it on the bank of the River Ouse, but the estate agent made the flood liability quite clear (the vendor had experienced five floods in 25 years). Having fallen in love with the house they decided to go ahead anyway – and the first flood happened a month after they moved in (2006) with eleven more floods following since then. The first ten of these were relatively shallow (several inches only) and of clean water and the owners were back to normal within an hour. However, the Boxing Day 2015 floods resulted in three feet of murky water inside the house, and some parts remained submerged for ten days. The owners themselves were trapped inside for four days, with provisions being delivered by a family member through an upstairs window.

Pumping water out through the window.

Original Georgian window now reinforced with concrete, and has bespoke barriers.

Some resilience measures had been installed by a previous owner (raised electrics, 6" square quarry tiles with waterproof adhesive on the floors and tiling on the lower part of the walls) but there were no flood barriers or pumps. However, the 2015 flood caused the quarry tiles to pop up from the floor, having become detached due to the highwater pressure exerted. As part of the repair process the owners decided to have the house tanked up to dado rail height and much larger tiles laid on the floor, with full tile adhesive, not the 'dot and dab' method as used with the previous tiles. In keeping with the age of the house, the owners chose parquet-effect ceramic tiles for the lounge, and wooden floor-board effect ceramic tiles for the hallway. A solution for the original Georgian bow windows (with the approval of the local Conservation Officer) has been to reinforce the surrounds with concrete, and then have window barriers tailor-made to protect them in future extreme floods. Cleaning products are kept on high shelving, rather than below the kitchen sink - this means fewer items to lift when a flood warning is received.

Wooden-floorboard-effect ceramic tiles in hallway and easily removable stair carpeting.

Removable kitchen – baskets for storage and eye level oven with separate hob

Other measures include:

- Main sump pump in kitchen, smaller one in lounge, and a third pump kept as a reserve, in case one of the others fails.
- Both electric fire and entire fireplace are removable.
- Quick release hinges fitted to internal doors.
- The kitchen units are free standing so can be moved, just the granite worktops stay in place supported on metal legs.
- Water resilient paint in utility room.
- Large furniture items raised on steel trestles.

Dedicated storage box for barriers, trestles etc. in the garden where they are accessible when needed.

Sue in Cumbria

Mid-terraced house
Flooded multiple times

Top Tip

Move your boiler upstairs, so if you do flood again, you still have heating and hot water.

When Sue's home in Cockermouth was flooded to a depth of four feet in 2005, she thought it was going to be a 'one off', as there hadn't been a serious flood in the area for 40 years prior to that.

Then came a flood in 2008 which was 45cm (18") deep and Sue began campaigning for flood defences in the hope these would solve the problem. However, the major flood of November 2009 resulted in seven feet of water invading her home. Sue said that being flooded was the easy bit, the hard bit was the months it took to recover. So she resolved to make some changes which would reduce the amount of time it took to recover in the future. Following the 2009 event, Sue could no longer get flood insurance. Sadly, her house flooded again in 2015 and she made use of the government's £5,000 grant to make some additional modifications. The gas central heating boiler was moved upstairs, so that there is now no loss of hot water or heating in the aftermath of a flood and Sue had a wood-burning stove fitted downstairs. both being essential for the drying and cleaning process.

When Flood Re was launched in 2016, Sue was very pleased to be their first customer!

Free-standing stainless steel kitchen with free-standing appliances.

The window sills are made of hardwood.

Resilience measures included:

- Free-standing stainless steel kitchen with free-standing appliances, which can be moved to safety. The walls are tiled from floor to ceiling, using water-resistant cement and grout; internal door re-hung with hinges allowing it to be lifted off and moved upstairs.
- A flood-resistant door has been installed, which allows additional time for moving items before the water has to be let in.
- The ground floor is tiled throughout, using water resistant cement and grout – it can be hosed down and disinfected after a flood.
- The window sills are made of hardwood instead of the usual easily-damaged softwood.
- The fireplace surround is also made from hardwood, and has successfully survived a flood.

The fireplace surround is also made from hardwood.

The ground floor is tiled throughout, using water resistant cement and grout

The Gallery in Yalding

3 storey detached house with an Art Gallery on ground floor Flooded 2013

Top Tip

Hardwood furniture can survive a flood and just needs cleaning and leaving to dry.

Prior to the Christmas day floods of 2013, Riverside was a 2-storey family home. The house had regularly flooded, but the building skirt system, a butane rubber membrane attached to the house and fitted by the previous owner in 2002, usually coped quite admirably and no water entered the property.

However, the 2013 flood overtopped the building skirt system and seriously damaged the house.

The family decided they could not go through another major flood and face so much disruption again; they were out of their home for 15 months and had terrible problems finding accommodation that would also take their animals. So, the family decided to add an extra floor to the house and move upstairs. The ground floor is now an art gallery during the 'non-flood months'.

Measures taken:

- They have a small industrial kitchen downstairs which serves the gallery when it is open (this can easily be hosed down and sanitised). It was interesting to note that a hardwood dresser had survived the deep floods and remains in use. (the dresser was repaired by the insurer).
- The newly sited staircase has only minimal carpet, which can easily be replaced. Almost everything on the ground floor can be evacuated upstairs if required.
- To the exterior of the property, the building skirt system can be pulled up to around a metre high round the whole house when needed. (The rest of the time, it remains hidden in a trench under easily removed decking).
- The walls are reinforced with steel supports which are built into the concrete rendered internal walls (this helps to reinforce the structural integrity of the house, when a large amount of water is being prevented from entering the property).
- The ground floor is also tanked.
- They have two seepage pumps and a 12cm (5") main pump fitted to a sump under the house.
- They also have non-return valves fitted on all wastewater pipes. The building skirt system works well in most floods and requires minimal maintenance.
- Additionally the current owners have fitted a large generator above the garage that can power the entire house during flood events and ordinary power cuts.
- A chemical toilet is available for use should the house be flooded for any time. The owners should be able to remain in the house should the property flood again.

The building skirt system can be pulled up to around a metre high round the whole house when needed.

The building skirt system usually coped quite admirably and no water entered the property until it was overtopped in 2013.

The staircase has only minimal carpet, which can easily be replaced.

A hard wood dresser had survived the deep floods.

2020 UPDATE

The owners had to use their flood skirt 3 times over the winter of 2019/20; Once just before Christmas, then again in February and March. Each time the water was approximately 60cm (12") deep all around the house. The skirt held well with some minor seepage, but the main sump pumps operated faultlessly and kept the water out, so the family remained dry. It is worth noting that they have their own back up generator, which gives them peace of mind, as the local electricity sub station is at risk of flooding. There are promising plans to move it to higher ground, as many householders in Yalding depend on the availability of electricity to operate their pumps.

The small industrial kitchen downstairs which serves the gallery when it is open.

Sue and Rob in Lancashire

Detached two-storey house Flooded in 2015

Sue and Rob bought their 1930's detached house in 1986. The house was first surrounded by floods in 1995 and following that, a further 14 times, until they flooded internally during Storm Desmond in December 2015. They believe that the void of the house will have flooded on every previous occasion but as the water didn't come above the floor boards, it was not classed as an internal flood.

They said that the repair process was extremely stressful and traumatic, with a lot of the work being of an extremely poor standard and much of which had to be redone. To this day, they feel that they haven't got their home back to the standard it was before the floods, a fact they find extremely upsetting. They said the whole experience has left them depressed and traumatized. Sadly, during the repair process, they were flooded again and because of this, they didn't get back into their home again until the end of April 2017!

They decided to make their home resilient, as it felt like common sense and they didn't want anyone else who lived in the house after them, to suffer as they had.

The cause of the flood now has a bund along it's sides.

Top Tip

Keep an emergency kit filled with everything you may need for loss of power, such as torch, matches, camping stove, soup, hand sanitiser etc.

Sue and Rob's detached house was first surrounded by floods in 1995 and following that, a further 14 times.

Flood resilient work included:

- A pump is under the floor to pump any flood water outside.
- Closed cell insulation under the floor.
- A waterproof sub floor membrane (which can cope with being under water for 30 days) and then an engineered oak floor finish on top.
- Cavity wall insulation replaced with water proof insulation.
- Cement render to the walls.
- Electric sockets further up the walls, wires now come down the walls.
- Waterproof rendering was applied underground to the foundations and 30cm (12') above ground.
- Water resistant spray to walls above the render.
- Self-closing air bricks.
- Barriers to all external doors.
- French Windows have flood guards fitted.
- Exit points for waste pipes have all been sealed.
- Rooms without floor voids have been raised, concreted and have been tiled with ceramic tiles.
- The kitchen is on legs with removable kick boards.
- They have 2 puddle sucker pumps (which can pump down to 2mm of water), a spare pump and a generator.
- Rob has built a wall with substantial foundations in the garden.
- They have non-return valves fitted to the sewers.
- White goods are raised up on plinths.
- Shower, sink and washing machine have separate non-return valves.

The village also now benefits from a flood alleviation scheme.

Top Tip

Use waders, waterproofs and walking poles if you have to walk in flood water, as pavements lose definition during a flood.

Self-closing air bricks and waterproof rendering was applied underground to the foundations and 30cm (12") above ground.

Wall with substantial foundations in the garden.

A waterproof sub floor membrane with an engineered oak floor on top.

Electric sockets further up the walls, barriers to all external doors and non-return valves fitted.

White goods are raised up.

The kitchen is on legs with removable kick boards.

Maya and Kieran in Lancashire

4-storey, stone built 19th century end of terrace house. Flooded 2017

Maya and Kieran had one previous 'near miss' and one flood that only came from under the floor boards.

This was because the flooding caused a power cut, consequently cutting the power to their underfloor pump. However, the flood of the 23rd November 2017 was much worse and flooded their downstairs kitchen to a depth of 5ft. Their boiler was ruined and they lost a lot of possessions that had been stored in the front cellar room. They had to move out, which was a difficult time for them and their young family. Their daughter (now 11) was deeply traumatized and still worries about flooding to this day. As a result, they decided to sacrifice a living room and move the kitchen upstairs. They had a struggle with their insurance company, who wanted to replace 'like for like', so they decided to take a cash settlement and do the work themselves. Due to the budgetary restrictions of a young family, the work to restore the kitchen is an ongoing project, but they plan to end up with a 'hose down and get on with life' finished room.

The basement room previously housed the kitchen and was extensively flooded to a depth of 5 feet.

The couple moved their kitchen upstairs.

To date the following actions have been taken:

- Kitchen moved upstairs.
- Replaced original window with a flood proof window.
- Fitted a flood door.
- Moved boiler up the wall.
- Isolate the electrics, so upstairs can continue to function during a flood.

When I asked Maya and Kieran what made them decide to move the kitchen upstairs, their reply was very poignant. "So we never have to disrupt our children's lives again, so we never have to move our children out again and never again spend Christmas in a hotel room." They want their home to be able to continue functioning during a flood and let downstairs flood, safe in the knowledge they can hose it down afterwards.

Original window replaced with a flood proof window.

Flood door fitted.

White goods in the basement room are now raised up.

Karen and Ken in Lancashire

Semi-detached house. Flooded 2017

Karen and her husband Ken have lived in their semi-detached home for 32 years. Prior to the flood of November 2017, they had never flooded and didn't consider themselves at risk of flooding.

When the flood water came rushing down the road (which they believe to be due to a blocked culvert and increased development), they didn't think for one moment that they'd flood. It was only when their bin was knocked over by the water that they began to worry. Immediately, Ken moved his car as high up the incline of their driveway as he could and the next morning, realised that he was the only person on the street not to lose his car to the flood water. They tried to move as much as they could in the short time they had, before the water came in through both doors and air bricks. It also came in via their washing machine and dishwasher. The whole of their ground floor was flooded 'up to the 3rd step' on their stairs. Karen recalled being devastated to find that all her memories that were stored in a pine chest, (including children's first shoes, baby toys and photos of their late parents) were destroyed. She advises that everyone should keep precious memories and documents upstairs. As the couple witnessed how the water got into their home, they decided to try to keep it out.

Flood Barrier to basement door and window.

Top Tip

Karen had kept all the receipts for new purchases upstairs and said how handy that was when making a flood insurance claim.

The work included:

- Installing 'self-closing' airbricks.
- Flood barriers to both doors.
- Non- return valves to washing machine and dishwasher.
- Plug sockets higher up the wall.

Raised plug sockets and non- return valves to washing machine and dishwasher.

Debbie in Lancashire

3 storey stone detached house. Flooded 2017

Debbie has lived in her 1904, 3 storey stone detached house for 10 years and has always known there was a history of flooding in her area. Her home is right next to the River Conder.

Despite this she had never flooded, not even during storm Desmond, when much of Lancaster and Cumbria was devastated. On the 24th Nov 2017, it had been raining heavily all day, and the river levels were high. She was alerted to the police and fire brigade outside as water was rushing down her road and was also coming up through the drains, as the river had overflowed its banks. The flood water in her back garden would eventually reach around 4ft deep, the same as in her basement (utility room, storage space, spare bedroom, boiler), where the water had come up through the ground and a drain. Debbie tried not to move out but the damp and cold became too much, so she lived in a hotel for 3 weeks, whilst the basement was cleared, cleaned, re-plastered, flooring removed, drying out started and boiler replaced. She lost many sentimental possessions that cannot be replaced, such as old photos, childhood toys and books.

Self-closing airbricks.

Debbie's local flood action group had arranged for a bulk purchase discount, so Debbie paid for and installed measures herself. Work done:

- Flood barrier to basement door and window.
- Self-closing airbricks.
- Non return valve to drain.
- Side wall treated with a water repellent spray.

Flood barrier to basement door and window.

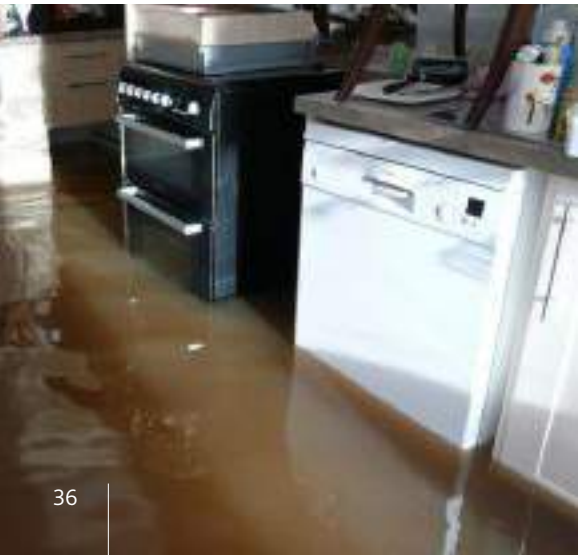
A Lancashire couple

Detached house
Flooded 2015

This Lancashire couple's home had previously flooded once, before they lived there. It flooded again during storm Desmond, this time from a different direction. They moved as much as they could before they and the wife's elderly mother - who lived with them - were evacuated in a boat by the fire service.

The house took a long time to dry out because initially, the contractors carrying out the repairs had failed to remove the insulation, which inhibited the drying process. The whole of the ground floor had to be totally gutted, including the ceiling.

The couple realised that unless they did something to stop the flood water from entering their home, they would be unable to sell it in the future (if they chose to), but also that they could not continue to live there with any confidence of another flood not occurring. They did a lot of research and decided to improve the internal resilience but also to invest heavily in trying to keep the water out of the garden and home. They did the following:



At the perimeter of the garden one-metre-deep holes were filled with concrete, into which posts and reinforced 'Task Green' waterproof fence panels were fitted.

Top Tip

This couple have invested in a generator, to enable the pumps to keep running if the electricity fails.

The front entrance gate is the same material as the fence panels and is fitted tightly to prevent ingress of water.

- Filled in the suspended floor with concrete and installed under floor heating. (They used a plastic floor covering, as they were mindful that the elderly mother might fall and injure herself on a ceramic floor).
- Plaster was replaced with a lime-based mix.
- Plug sockets were raised up the wall.
- At the perimeter of the garden their contractor dug one-metre-deep holes, which were filled with concrete, into which 'Task Green'* waterproof posts and fence panels were then fitted, with the lowest panel sunk into a 2ft trench, also filled with concrete. The contractors also reinforced the fence panels with steel bars, to enable them to withhold the weight of deep water.
- All rainwater drains are now independent of those outside of the property and run through a series of French drains into a large sump (formally a septic tank) into which a strong pump is fitted which pumps the water through an existing pipe into a ditch outside the garden boundaries.
- They have another pump and generator as a backup.
- The front entrance gate is made of the same material as the fence panels and is fitted into a frame which has been made to fit the contours of the drive. The gate has a thick black sponge seal that can be tightened manually to prevent ingress of flood water.

**NB Task Green has since gone out of business, but a quick internet search found another similar brand.*

Rainwater runs through a series of French drains into a large sump into which a strong pump is fitted which pumps the water outside the garden boundaries.

They have another pump and generator as a backup.

Wendy and Ben in Lancashire

Detached old cottage Flooded 2015

Wendy and Ben live in an old cottage in Lancashire. In the past, they had almost flooded, but water had never got into their home.

Sadly, in December 2015, during Strom Desmond, Wendy noticed her carpets were wet and very quickly the entire ground floor was flooded, to a depth of about 4ft. Wendy noticed that the water was entering her home via the doors and not from underneath as her floor was concrete. The couple turned off the electricity and spent the night upstairs. Wendy recalls having to wade through the water in the dark to get some insulin for her diabetic dog. She was upset at the sight of her Christmas tree floating in the flood water. However, her Grandfather clock that was built in 1740 was still ticking away and continued to do so. Wendy sadly recalls that she often looks for things and remembers that, 'they went in the flood'.

As the flood occurred over the Christmas period, the couple decided to hire their own dehumidifiers and remove wet carpets. They say their prompt action aided the drying time. The couple were out of their home for 6 months, whilst the cottage was repaired. They had already decided that things had to change and took advice from family who were in the building trade. She also praised her insurance company, as they rang every week to see how the repair works were progressing.

Wendy's Grandfather clock that was built in 1740 was still ticking away even in 4' of water.

The couple were out of their home for 6 months, whilst the cottage was repaired.

The following changes were made:

- Electricity wires now come from upstairs.
- Sockets placed up the walls.
- Tiled floors to much of the ground floor (she decided on a sacrificial carpet for her living room but hopes to roll it up, if ever she was flooded again).
- White goods in the utility room are now on a plinth.
- Waterproof cement render plaster.
- Flood barriers to all external doors and one internal door, and there is a step down into the kitchen.
- Prior to new local flood defences being installed, the couple would lift all their belongings out of harm's way before they went away.
- The couple now keep all important documents upstairs.

Much of their Oak and Mahogany furniture survived the flood. Ben said, if you are patient and allow the wood to dry out, drawers will open and behave as they should again.

Top Tip

If you are patient and allow the solid wood furniture to dry out, drawers will open and behave as they should again.

White goods in the utility room are now on a plinth and even the wood burning stove in the lounge is raised up.

Flood barriers to all external doors and tiled floors.

Christine in Lancashire

Mid-terraced house
Flooded 2015

This bungalow had never before been flooded in the 60 years since it was built, but that all changed in December 2015.

Storm Desmond caused unprecedented flooding in many areas of north-west England and here it was the River Wyre that invaded the home of a retired couple, who also ran a guinea pig rescue centre. To make things worse, not only was the flood completely unexpected, but it happened at night and the power failed immediately. The water was rapidly increasing in depth so, having no upper storey, the only solution was for the owners to evacuate. This involved the elderly couple, 3 dogs and 36 guinea pigs leaving through a window in the pitch dark. Once outside, the rushing water was already over wellington height and was enough to knock you off your feet. The owners needed help in struggling up the driveway to escape and they describe the experience as 'very frightening'.

The aftermath was heart-breaking, as everyone in the local area was in the same position, and the couple were unable to begin emptying their home. Everything was left 'wet and rotting, including all the clothes in the wardrobes' recalled Christine.

Flood resilient front door has been installed.

A 'concrete type' fence has been erected to hopefully slow the flow of water, providing extra time to evacuate.

The flood water had eventually reached a height of 1.5m so everything was completely ruined. Consequently, the loss adjuster advised that not just their possessions, but also the floors, plasterwork, and nearly all the furniture would have to be discarded. The only exception was a grandfather clock, whose mechanism was right at the top of the case and was still chiming away, despite its ordeal!

The owners were out of their home for 7 months but were fortunate in being able to stay with relatives who could also accommodate the animals. Then, unbelievably, just six weeks after moving back in, another flood occurred. Although this time the water only came 'just over the skirting board' it was still enough to ruin all but the tallest items. Not wanting to go through such devastation a third time, they decided to include some resilient features in the repair process.

- A non-return valve in pipework, to prevent backflow.
- The sewer pipe also now has an NRV, as a dead rat was found in the kitchen following the first flood!
- The external brickwork has been sprayed with a waterproofing agent.
- Flood resilient doors have been installed throughout.
- In conjunction with a neighbour, a 'concrete type' fence has also been erected. Although they don't expect this to stop the water, the couple are hoping it will at least slow the flow down, providing extra time to get out if necessary.

Flood resilient patio doors have been installed.

Non-return valve in pipework, to prevent backflow.

Mark in Corbridge

A solid stone terraced house Flooded 2005 and 2015

A solid stone terraced property in Corbridge, situated about ¼ of a mile from the River Tyne. The home-owner's family bought the property in 1996, which unfortunately suffered flooding to 1 metre depth in 2005. After recovery, the house was rented out for a few years only to suffer flooding again in 2015, this time to a depth of 1.5m (58").

The owners, a young couple with small children, readily admit to not having much disposable income. They would have liked to have done more to improve the flood resilience of the house and now have a 'flood fund'. They are saving for flood barriers, a non-return valve and a sump pump. They praised their Local Authority officer for the support he gave.

They decided to give preference to reducing the impact any future flood could have and took the following actions, using a combination of the £5,000 grant and some savings.

- Filled in a suspended timber floor with concrete.
- Installed hardwood flooring with rugs (They said the wet carpets were a nightmare to lift out and slow the drying process).
- Installed solid oak doors.
- Rendered walls with waterproof cement.
- Kitchen doors have easy release hinges, so the doors can be removed quickly.
- The household electrics have been separated onto two different circuits, so if they do flood again, they will still have electricity upstairs.

The Belfast sink is easily cleaned.

Top Tip

If you live in a terraced property, try to work with your neighbours, to enable a cohesive approach to any resilient repair.

Tiled floors in the kitchen and utility areas.

Solid oak doors.

Kitchen doors have easy release hinges, so the doors can be removed quickly.

Hard wood flooring with rugs replace the carpets which were a nightmare to lift out and dry following the flood.

Rob in Corbridge

1740's solid stone detached house Flooded 2005 and 2015

The homeowners moved to Corbridge in 2014 and although they knew that the house had been flooded 10 years previous, they had been told that improvements had been made to a local flood bund. Since they had fallen in love with the property and garden, they decided to go ahead with the purchase. All was fine until Storm Desmond in 2015.

When they received the flood alert, they moved as many possessions as they could upstairs. The water slowly but surely encroached upon the property and by the evening they decided to leave with their two dogs and young baby. When they returned the following morning, their home had been flooded to the ceiling of the ground floor! They both admit to being in total shock to see their home like that. After the flood, the family lived in the house for 11 months, but it clearly was not appropriate for their needs, having a young baby and 2 dogs. The couple agreed that the recovery from the flood was far worse than the flood itself.

During the restoration, they took the opportunity to build an extension to the house and at the same time, incorporate some flood resilience into the repair so that if they do flood again, they can recover quickly and get home sooner.

Flood resilient work included:

- All external walls have a layer of membrane, a layer of galvanised steel cladding, closed cell insulation and horizontally fixed plasterboard, which can be removed and replaced easily.
- Concrete floors
- Under floor heating
- Porcelain floor tiles in the kitchen
- Engineered oak to the remaining floors, which does not expand when wet
- Oak internal doors
- Free standing, solid wood kitchen

The couple noticed that a lot of their hardwood furniture survived the flood and didn't need replacing. They favoured resilient repair over installing flood barriers, but do plan on buying some in the future.

Prior to the work being carried out the couple's Flood Re insurance excess was £15k, this is now reduced to £250!

Permeable patio areas surround most of the house.

Top Tip

Photograph absolutely everything that has been flooded, as it's easy to forget and lose out with your insurance claim. Start drying the property as soon as possible to speed up the recovery time.

Free standing, solid wood kitchen.

Porcelain floor tiles in the kitchen.

Oak internal doors.

Hard wood furniture survived the flood.

Engineered oak to the remaining floors.

Susan in Berkshire

A ground floor flat
Flooded 2014

Susan deals with risk management in her working life, so when she fell in love with this ground floor flat in late 2013, the fact that the local authority search process indicated a risk of flooding, it did not deter her. The River Thames had not flooded the area since 1947 and the house itself had never been flooded at all, so there was no problem obtaining insurance quotations. Nonetheless, to manage the risk, she planned to make her new home as resilient as possible just as soon as she was able to move in.

Contracts were exchanged one Friday in early February 2014, but that very same evening a flood warning was issued for the local stretch of the River Thames. Two days later this was upgraded to the most serious type, a 'Severe' warning. When Susan arrived on the following Monday morning to measure up for new curtains, she described the scene as 'almost like Armageddon' - in fact, she had to use a rowing boat to reach the house! At first it appeared that the flood water had spared the house itself, but it was a different story at the rear of the property, where flood water had come in via the back door and also up through the shower outlet. Thankfully, the water depth was only just above the skirting boards, so Susan's first action was to deploy two submersible pumps, which successfully prevented it getting any deeper. Most of the water was groundwater and so was relatively clean, but in the shower room there was wastewater.

Susan had to use a rowing boat to reach the house!

Susan has no complaints about her insurers; a loss adjuster was quickly sent out and within a week, driers had been brought in and damaged components were stripped out. Because of these quick actions, the house only took a matter of a few weeks to dry out. But then Susan ran into the problem experienced by so many flooded homeowners – the insurance policy can only indemnify, i.e. 'put you back to where you were' so the planned resilience measures could not be installed as part of any repair work.

Ceramic tiled hall with rugs.

Toilet bungs for each of the bathrooms.

Temporary flood barrier for cellar.

Flood barrier on the back door.

Top Tip

Have pumps tested each year, and take out a maintenance contract for flood doors and flood barriers, so that the gaskets get checked annually.

Solid wood kitchen with sacrificial kickboards.

Puddle sucker, non return valves added to all the pipe work and sump pumps in the outhouse.

Flood resilient work included:

- Susan made use of the government £5k grant to pay for two 'sump pumps' in the outhouse, which is where the water first entered. One is the main pump, the second is the back-up, and the electrical supply for both is well above flood height.
- The back door is protected by a flood barrier (which is left permanently in place).

Ceramic tiled bathroom floor.

- A flood resilient front door has been installed.
- Carpets and laminate flooring replaced with ceramic tiles, bonded to the concrete floor with waterproof adhesive. The only exception was the three bedrooms, where cheap 'sacrificial' carpet was chosen.
- All replacement woodwork including skirting boards, internal doors and built-in wardrobes are made from solid wood, which has been varnished.
- Solid wood kitchen.
- NRVs have been added to all the pipe work.
- Toilet bungs for each of the bathrooms.

Other essential items are kept close at hand:

- A portable pump.
- Gel-filled absorbent pads.
- A second barrier for an internal door.

A flood resilient door to the front of the property.

Cottage in Oxfordshire

Detached house
Flooded 2017

This detached property suffered surface water flooding in the kitchen area following torrential rain in 2017, because the adjacent roadway is 30cm (1') higher than the kitchen floor.

It was obvious that this problem would reoccur (likely with increasing frequency due to climate change), so a specialist survey was undertaken with an ensuing recommendation that a cavity drain waterproofing system be installed, along with a small packaged pumping station. The work was carried out by a specialist membrane provider and is a typical structural waterproofing solution, where external ground levels are high and surface water is on the road outside.*

The existing fitted kitchen and floor finishes, were removed and then re-installed following completion of the work, adding to the cost-effectiveness of the chosen solution.

Since the work was completed, the area has already experienced a similar downpour and the owner was delighted to find that the property remained dry.

System components included:

- Cavity drainage membrane system.
- Drainage channel.
- Sump pump (submersible package pump).
- Façade cream (water repellent façade-hydrophobic cream for cementitious-based building materials).

**These systems do not provide a hydrostatic barrier but provide protection by means of water management.*

IMAGES PROVIDED BY DELTA MEMBRANES

The 3mm floor membrane is also designed as an underlay for protecting oak floors.

Existing kitchen and floor finishes were removed, and then re-installed following completion of the work.

Cavity drainage membrane system and sump pump during installation.

Colette in Lancashire

Detached house
Flooded 2015

Colette lives in a detached house which was built in 1998. Her home was flooded on Boxing Day in 2015.

Colette and her husband had thought their house was safe because it is on a slope - but most of the flood water came up through the floor, via the washing machine and the ground floor toilet. Worse still, the flood water was contaminated due to the local sewage works being inundated. Because it was Christmas time, everything had been stored in wooden chests on the floor to make room for the Christmas tree. Consequently, all of the couple's ornaments were lost to the flood, including many family heirlooms and items collected over 30 years of marriage. Colette said that it was heart-breaking to lose them but that they were advised not to wash and keep anything for health reasons.

The couple approached the National Flood Forum for help. Colette states that they were 'wonderful' and gave lots of advice and information, as well as being quick to organise information events. The couple were out of their home for eight months but work took around 12 months to complete (they moved back in towards the end of the work).

Flood resilient doors have been installed.

Fires attached to the wall were replaced in all rooms with mobile fires that can be lifted at short notice.

A government flood grant of £5k was available, but this was insufficient and the couple paid around £15k in total, to fund all the adaptation and improvement works needed. They found it most frustrating that the insurance companies will not pay for flood resilience measures (only like-for-like repair).

Colette chose a mixture of resistance and recoverable repair:

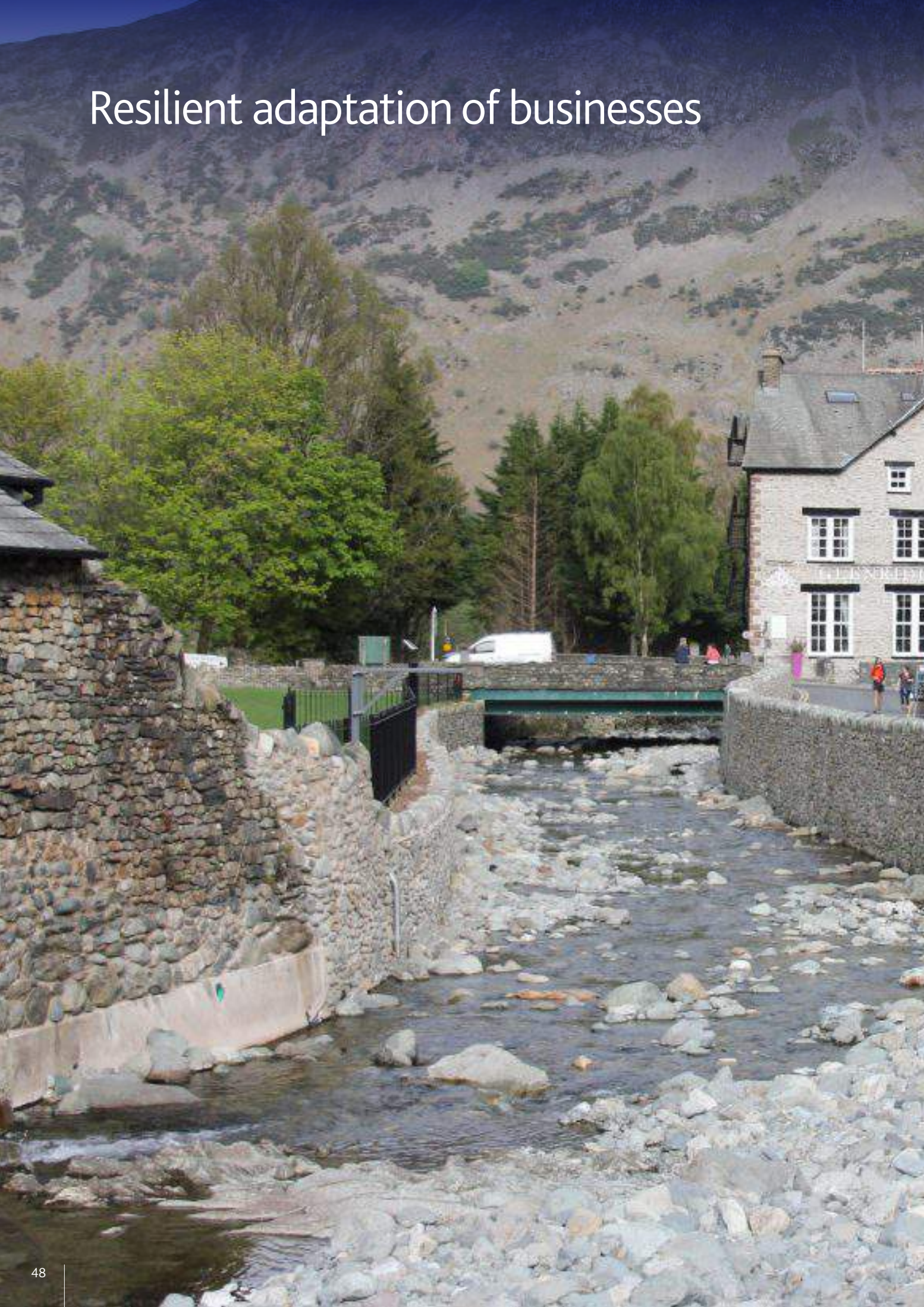
- Wall mounted fires.
- Cupboards are now on the wall and not on the floor.
- Brickwork sealed using special cement.
- Flood doors.
- Interlocking waterproof flooring.
- Sealed pipes.
- Rebuilt conservatory, so that entrance now faces away from direction water comes.
- Bought 100 absorbent packs to put around the house (these swell up and block water).
- Colette also formed a local flood action group and after numerous meetings and fighting their cause, work is being done locally to protect homes against flooding.

Absorbent packs swell up and block water.

Brickwork sealed using special cement.

Cupboards are now on the wall and not on the floor.

Resilient adaptation of businesses



Without exception, the business owners were driven by the need to get up and running as soon as possible after a flood.

Their financial livelihood (and the livelihood of the people they employ) is dependent on being able to do this. They all have plans in place to put into action, as soon as they are aware that a flood is imminent.

The Swan Hotel in Newby Bridge, Windermere

Large brick built hotel Flooded 2009 & 2015

The Swan Hotel is on the banks of the River Leven to the south end of Lake Windermere.

Sarah Gibbs has been the hotel manager for 11 years, during which time the hotel has flooded twice; in November 2009 and December 2015. Following the floods, Sarah commissioned a flood survey and was told that they were '1 in 1,000' year events. Sarah said she must be very unlucky to have had two 1,000-year events in the space of only 9 years! The floods caused substantial upheaval, great expense and the hotel had to close for 6 months. After the second flood, Sarah felt a particular responsibility towards the hotel shareholders and her staff, the latter of which depended on the hotel for their livelihoods. So, Sarah decided that she had to take action to mitigate the most significant risk that the business faced.

Sarah took the time to do some in depth research as to how, why and when the hotel flooded. She now understands the circumstances that lead to a flood and at what level it will flood. Armed with this information and supported by her insurers, Sarah has done the following to reduce the risk of flooding:

- Rigid temporary barriers are installed around the hotel to a height of 1.2m (4') The hotel has 'Flood Marshals' trained to put the barriers in place, which take 6 people about 1.5 hours.
- Door guards are fitted to external doors as a 'belt a braces' option.
- Non-return valves to all drains.
- Sump and pump fitted to the lift shaft (which flooded in the last flood).
- Smart airbricks to prevent water getting under the floors, as happened before.
- Several puddle pumps.
- Generators to power pumps and emergency lighting.
- The hotel has an extensive emergency plan, which all staff are trained in. It is regularly reviewed and refined. They have a 'dry run' every September to practice putting up all barriers.
- The floors all have a resin damp proof membrane beneath them, to prevent the water rising from underneath.
- The bar is solid oak and survived the 2015 flood. It has stainless steel fittings and easily removable equipment.
- The hotel kitchen is in the lowest part of the building. It has resin flooring (that survived the 2015 flood), which has now been extended up the wall to a height of 1 metre. There is washable plaster elsewhere and the kitchen equipment can be moved to a higher level if absolutely necessary.

As a result of all this work, Sarah was pleased to be able to report that they have maintained their insurance cover.

IMAGES PROVIDED BY AQUOBEX

Top Tip

Have an emergency plan, which all staff are trained in and is regularly reviewed and refined.

Rigid temporary barriers are installed around the hotel to a height of 1.2m (4'). The hotel has 'Flood Marshals' trained to put the barriers in place, which take 6 people about 1.5 hours.

The bar is solid oak with stainless steel fittings and easily removable equipment.

Door guards are fitted to external doors as a 'belt a braces' option.

The floors all have a resin damp proof membrane beneath them, to prevent the water rising from underneath.

Glenridding Hotel in Cumbria

250 year old stone built hotel Flooded 2015 & 2016

The 250-year-old Glenridding Hotel was flooded on 4 occasions between December 5th, 2015 and January 12th, 2016. Two of those floods caused complete destruction of the ground floor of the hotel.

The hotel was flooded by Glenridding Beck, which was overwhelmed by the vast amount of water, trees and rocks pouring down from the hills. The adjacent bridge was blocked by the amount of debris and as a result, the water burst through the hotel in huge volumes on it's way to the lake below. Selina Ali, the hotel manager, told me that she was shocked by the sheer amount of water that hit the hotel and how terrifying the whole event was. The damage to the hotel was extensive and enforced complete closure for a year, with some parts remaining closed for 18 months.

The hotel management team took the decision that this type of event should not happen to them again: They not only took extensive advice as to how to prevent any future flooding, but also how to put in resilience measures so that if they did flood, they would be able to clean up quickly afterwards. They also now have a detailed emergency plan, which all staff are familiar with.

Flood barriers go along the river side of the hotel.

Top Tip

Every November, we make sure our temporary barriers are put in place alongside the beer garden and left in place for the winter.

The gable end of the hotel has been strengthened with concrete cladding and large rocks placed in front of it.

IMAGE PROVIDED BY IBS ENGINEERED PRODUCTS LIMITED

The measures taken:

- In addition to newly upgraded Environment Agency defences, if a future flood warning should occur, the hotel has built a robust flood wall around the front and river side of the hotel, into which demountable flood barriers are fitted to protect the entrances.
- The gable end of the hotel (which sits in the river) has been strengthened with concrete cladding.
- Large rocks have been placed in front of it.
- The internal wall side has also been tanked.
- An open walkway from the front to the back of the hotel, now has doors and barriers and the floors are tiled and the walls tanked.
- Every November, the barriers are put in place alongside the beer garden and left in place for the winter.
- Non return valves have been fitted as necessary.
- The bar area is now tiled and tanked and given a contemporary look which disguises the fact that it is 'flood resilient'.
- The bar area is built in slate.

A robust flood wall around the front and river side of the hotel, into which demountable flood barriers are fitted.

Newly upgraded Environment Agency defences.

The tiled and tanked walkway through the hotel.

The bar area is built in slate.

Wateredge Inn in Cumbria

Large brick built hotel Flooded 2009 & 2015

The Wateredge Inn is situated in a beautiful location, on the banks of lake Windermere in Ambleside. It has flooded twice, once in 2009 and again in 2015. They didn't expect to flood again, as they had been told that the 2009 flood was a 1 in 100 year event.

One of the things that impressed me hugely was that the hotel now has a detailed emergency flood plan in place, which all staff are trained on and know what to do should flooding occur. All available staff will help to action the plan as soon as a flood warning is received. All roads around the area become impassable during a flood, so all bookings are cancelled and ground floor furniture is moved into first floor guest bedrooms.

Plans include:

- Installing 3 pumps into the lower bar area, which will be used as a 'sump' and water pumped out of the window from there.
- A petrol generator will be placed on the flat roof to power the pumps.
- All stock behind the bar is in trays and can easily be removed.
- The motor can be removed from the stainless-steel kitchen 'Chave block' (cooking area) and hydro-snakes will then be used to deflect the water.
- As much equipment as possible will be moved from the kitchen to an upper kitchen area.

The Wateredge Inn is situated in a beautiful location, on the banks of lake Windermere in Ambleside.

- Serving area can be lifted onto crates.
- Cold stores have rubber seals fitted but in addition, marine ply is temporarily sealed to the fronts.
- Flood barriers are fixed to all the doors.

Resilient work includes

- Windows have been raised a couple of feet higher up (Jackie, the duty manager recalled looking through the window and seeing the flood water up against it).
- The bar is now brick and has been treated with a waterproof spay.
- Sealed slate flooring throughout.
- The fixed seating is easily removed and the frames are now made of marine ply, which will recover if flooded.

The bar is now brick and has been treated with a waterproof spay. The floor is tiled.

All stock behind the bar is in trays and can easily be removed.

Top Tip

We make sure all new staff are fully aware of our emergency plan and know how to put it into action if necessary

The fixed seating is easily removed and the frames are now made of marine ply.

Cold stores have fitted rubber seals but in addition marine ply is sealed to the fronts.

The motor can be removed from the stainless-steel kitchen 'Chave block' (cooking area).

Windows have been raised a couple of feet.

Vital kitchen equipment is raised above the flood water level.

Focus on Hebden Bridge

NEW FOR 2020

Dragonfly Boutique in Hebden Bridge

Ladies clothes and accessories Flooded 2020

Joanne Gas runs an independent boutique selling ladies clothes and accessories in Hebden Bridge.

When Joanne took over the shop 3 years ago she was aware that it had flooded in the past and decided, in advance of any future floods, to make flood resilient adaptations so that when she did flood, the damage could be limited. Joanne has an incredibly supportive landlord who worked with her on the adaptations.

The flood in February 2020.

Flood resilient work included:

- A robust slot in steel barrier to the doorway (Joanne acknowledged that this wouldn't keep the water out but would give her time to move her stock to safety).
- The solid floor has porcelain tiles with waterproof grout and adhesive.
- Waterproof plaster to the walls.
- Copper, free standing clothes hanging rails.
- Plug sockets sited higher up walls.
- Solid wood desk and a large table onto which stock can be folded.
- Snake type plastic sacks form a second line of defence to both the stock room and the shop entrance (Joanne said these were useful in helping slow the ingress of water).
- High shelves in the stock room and free-standing solid plastic shelf units. (The bottom shelves can be emptied before a flood.)
- Sealed plastic boxes that contain different clothes sizes, which can be moved but hopefully would withstand the water if she didn't get the time to move them.
- The fridge now stands on a shelf.

Top Tip

Have a plan in place that everyone is aware of, so they know exactly what to do when the flood comes.

The flood in February 2020 came very quickly. Joanne's colleague Bryony, lives in Hebden Bridge and heard the flood siren. She dashed to the shop to put the flood barrier and snake type plastic sacks in place and moved all the stock higher up. Joanne could not get there because the road from her hometown of Todmorden was blocked by flood water. Joanne said Bryony was an 'absolute star' as she knew exactly what to do. Joanne felt extremely lucky compared to others as there was only around 10cm (4") of water in her shop. When the water receded, she, her partner and daughter used a large squeegee to clean the sludge from the floor. **She then steam cleaned the floor and was able to open her shop for business the very next morning!** Joanne strongly believes that more investment should be made into recoverable repair and thinks it is money well spent.

Copper, free standing clothes hanging rails.

Sealed plastic boxes that can be moved or hopefully would withstand the water if she didn't get the time to move them.

Raised fridge in the stock room and free-standing solid plastic shelf units.

A robust 'slot in steel barrier' is fitted before a flood.

Snake type plastic sacks.

Solid floor has porcelain tiles with waterproof grout and adhesive.

Heart Gallery in Hebden Bridge

Brick and stone former chapel Flooded 2009, 2015 & 2020

This business occupies part of a former chapel, built in 1777, so it has probably seen quite a few floods in its time. The last two have occurred during Alison Bartram's occupancy and, given the building's location, more floods are very likely in the future.

Alison's business had only started out in 2006 and she was determined to continue with 'her baby', which had represented both financial and emotional investments. Although the business still had flood insurance, at the time of the flood event of Boxing Day 2015 they discovered that they were under-insured by 12%, which meant that Alison had to fund a shortfall of £20k. In the end this money was well spent, because it meant that all repair works could be designed to make the shop flood resilient. Everything that could be, was salvaged and repaired following the 2015 devastation, including the original solid wood floorboards, some of which were 'upcycled' to make the new counter tops, with the rest

Top Tip

As part of the process of 'stitching themselves back together' the business insisted on supporting local businesses by employing them for the repair work, rather than those suggested by their insurers.

Floor surface is finished with porcelain tiles patterned to mimic floorboards.

being given to a local carpenter for use in other projects. The original hardwood display cabinets also survived and were cleaned and re-coated . Alison stressed that the local community feeling is very strong, with an 'all hands on deck' approach, even from people that were not directly affected but who helped with the cleaning process.

The measures taken:

- Floor is now concrete with steel supports and insulation below. The surface is now porcelain tiled, patterned to mimic floorboards.
- All plaster was removed from the walls, which were taken back to bare stone or brick, and then treated with a sealant, followed by a resilient concrete render.
- Counter base and new shelves are made from marine ply and coated with sealant.
- Electrics have been raised.
- Non-return valves (NRVs) were added to all outgoing pipework, including handbasins.
- A 1.2m (4') flood barrier fits into doorway, to deal with low level floods, or buy time for moving contents in more severe events.

An unusual benefit of the refurbishment process was the discovery of additional space, formerly concealed by a false ceiling. This has now become the 'Save Our Stock' (SOS) area, accessed by big ladders and containing lots of boxes, and bubble wrap, ready to accommodate stock in future floods.

2020 UPDATE

The Heart Gallery was flooded again on February 9th to a depth of 25cm (10'); the water came up through the floor and not through the metal flood door. Thanks to their robust emergency plans, they were able to put all their stock high up onto their 'Save Our Stock Shelves.' The resilient adaptations the Gallery had made enabled them to open again within only 5 days, after thorough cleaning. They reported that they had only minimal redecorating to do; once the salt had come out of the render, they sanded it, used a damp block paint, and then redecorated. Considering their original flood resilient adaptation cost £30k (the original insurance claim for contents alone was £50k), the adaptations have more than paid for themselves in just one flood.

Additional space formerly concealed by a false ceiling has now become the 'Save Our Stock' (SOS) area.

The walls were taken back to bare stone or brick and sealed, followed by a resilient concrete render.

Counter base and new shelving is made from marine ply and coated with sealant.

Element (jewellery) in Hebden Bridge

Brick built terrace of shops
Flooded 2012, 2015 & 2020

Severe flooding affected Hebden Bridge in December 2015, but this business is situated in a dip and so was hit even harder than most – 1.7m (5'6") of water came into the premises.

The destruction far exceeded anything that previous smaller floods had inflicted, although the concrete floor laid down after the 2012 event survived well. The polished surface allowed the proprietor to simply 'sweep out, bleach' and get on with everything else. The aim this time was to create a contemporary retail space with pretty, industrial, flood resilient materials, which has been successfully achieved.

The measures taken:

- Walls were stripped back to the stone or brick and then sealed. Some walls have been left bare and others are rendered with a smooth resilient product, then finished with smooth masonry paint. A feature wall is covered in exterior grade tiles.
- Interior doors are now 'Rainscreen' panels, mounted on stainless steel supports.
- Display cabinets now made from powder coated acrylic, which is washable (formerly MDF).
- Where wood was still needed, marine ply has been used.
- All the electrics have been raised up.
- 'All-in-one' style computers, easily moved, have replaced those that had base units on floor.
- Desks in the office area can be 'cranked up' to standing height.
- Stow away trestles are used to raise soft furnishings, including the sofas that come apart for storage.
- Sump with pump, sited by front door, to remove any water as it arrives.
- Diesel generator, activated by a float switch now sits in its own housing at the rear (this provides power for the pump, heat, light, phones and cleaning equipment needed post-flood until mains supply reconnected).
- The large display windows (3m^2) have bracing that can be lowered when needed, to protect the glass from water pressure.
- A dedicated storage area has been created on a mezzanine floor, for flood-related equipment and also to house easily damaged items, such as packaging, during floods.

All the above measures are not only practical, but also mean that the team feels more resilient and able to cope with the emotional strain that comes with a flood.

The company's insurers are so impressed with what has been done that they have still retained flood cover (unlike many businesses in that area), albeit with a considerable excess.

2020 UPDATE

Element Jewellery was flooded again on Sunday February 9th, 2020. The water was just over one foot in depth. Due to their emergency plans and all the resilient adaptations they had made, they lost nothing but a small amount of packaging material! Once they had cleaned up, they were able to open for business just 3 days later.

Top Tip

The business has a flood plan, which is regularly practised.

All electric service points are raised above flood level.

Brick wall cleaning.

Some walls were taken back to bare brick, and sealed.

Flood recoverable counter and in the background the interior doors are now 'Rainscreen' panels.

A dedicated storage area has been created for flood-related equipment and easily damaged items.

Stow away trestles are used to raise soft furnishings, including the sofas that come apart for storage.

The display windows have bracing that can be lowered when needed, to protect the glass from water pressure.

Display cabinets now made from powder coated acrylic.

Watergate Tea Rooms in Hebden Bridge

17th Century stone building Flooded 2015 & 2020

The present owner took over this team room business in 2014. To the best of their knowledge, the ground floor of the 17th century building had not previously been flooded, although it was know that the cellar had.

On Boxing Day 2015, the whole of the ground floor was waist deep in flood water and sewage. The power of the water meant that the fridges and freezers had floated in to the central workstation area and electricity feed, knocking it over and bringing down part of the ceiling. When the flood receded, it left around 15cm (6') of silt.

The tea rooms were shut for 4 months whilst drying out and repair work was undertaken. The owner's insurers insisted that repairs were flood resilient and supported them during the process.

Ground floor was concreted and tiled with wood effect ceramic tiles.

Flood barriers to all doors.

Flood resilient repairs entailed:

- Filling in the cellar with expanding concrete, to give the property a foundation, which it hadn't had before.
- Rewired, so that cables came down the walls, with all sockets raised to high level.
- Ground floor was concreted and tiled with wood effect ceramic tiles, waterproof grout and adhesive.
- Waterproof plaster.
- Window frames replaced with marine ply.
- All kitchen equipment is stainless steel.
- Easy clean white plastic walls, where appropriate.
- Flood barriers to all doors.
- Self-closing airbricks.
- Non return valves as necessary.
- Walls were repointed where necessary and coated with a water proof spray.

2020 UPDATE

Watergate Tea Rooms was flooded again on February 9th, 2020. Thanks to the resilience works, the flood water was only 12cm (4½") deep throughout and covered some lower shelves of storage units, resulting in loss of food/paper goods (it was waist deep in 2015). After thorough cleaning and disinfecting, they were able to open for business again after only 3 days, with little financial loss to goods. No insurance claim was made.

All kitchen equipment is stainless steel.

Non return valve.

Walls were repointed and coated with a water proof spray and self-closing airbricks fitted.

NEW FOR 2020

Little H café and bar in Hebden Bridge

Old stone built shop
Flooded 2012, 2015 & 2020

Charlotte is the owner of Little H café bar in Hebden bridge, which was flooded in February 2020.

The previous owners had installed a kitemarked flood door, which held back the water and gave them time to move stock to safety, but Charlotte reported that this time, the flood water came in from underneath the vinyl flooring. The previous owners had also installed a stainless-steel kitchen, which survived the floods and only needed a deep clean and disinfection.

Using limited funds and the Government grant, Charlotte made the following changes:

- Laid a stone floor using waterproof grout and adhesive.
- Installed thick wooden skirting boards and gave them several coats of varnish.
- Fitted a new main counter, which is made of varnished scaffolding planks.
- Some walls are stone and can be washed down after any future flood.

Stainless steel kitchen

Main counter made of varnished scaffolding planks.

Kitemarked flood door and stone flagged floor.

Book Case book shop in Hebden Bridge

In terrace of shops Flooded 2011/12 & 2015

The business owner has been flooded twice, with the owner ruefully admitting that they thought the 2011/2012 event, when 120cm (4') of water entered the shop, was the worst that could happen.

Sadly, 2015 saw around 2m (6') of water engulf stock on tables, the sales counter and all but the highest shelves. Their insurance paid for the repairs after the first flood but the business was unable to obtain any flood insurance afterwards, so the 2015 event saw them retain everything that could be salvaged, which was extremely hard work but worth the effort. They were then determined to do everything possible to avoid or reduce damage as far as possible in any future floods, so they took advice from a knowledgeable local builder, who happened to be a friend of the family.

The 2015 flood saw around 2m (6') of water engulf stock.

Resistance measures to keep the water out:

- External flood barrier which couples up as the shop signage and can be lowered down.
- Powerful sump pump with automatic float switch to remove water as soon as it enters.
- Flood resilient front door.

Flood recoverable methods, in case the water still manages to get in:

- Concrete flooring, finished with composite tiles.
- Walls have been taken back to the bare brick, sealed, then finished with painted marine ply which looks like ordinary wood, but can be removed, washed and disinfected and then put back.
- Plastic door architraves.
- Raised electrics.
- A diesel generator is kept on higher ground at the rear of the property, which will supply power for lighting and cleaning when the flood water has receded and the mains power is still off.
- Wall shelves fold up, and legs are inserted to create tables for storing stock from lower levels.
- NRV on sewage system.
- Business flood plan.

2020 UPDATE

The Bookcase was flooded to a depth of 20cm (8") on Feb 9th, 2020. The owners described this as being 'much better' than the last flood, which was 2m (6') deep. Unfortunately though, their pump stopped working and they believe they would not have lost any stock had this not happened. The shop now has a maintenance plan in place to check that the pump will work properly next time. They lost some lower level stock and a computer (total cost estimate approx. £2,500). After intensive cleaning, they were able to open the shop again within only 1 week but kept the dehumidifiers running for a month.

Concrete flooring, finished with composite tiles.

Plastic door architraves.

NEW FOR 2020

Sue, Hairdresser in Mytholmroyd

Old stone built shop Flooded 2012, 2015 & 2020

Sue owns a hairdressing business and has rented her salon for 38 years. During this time, she has suffered from 3 significant floods: June 2012, December 2015, and February 2020.

After the flood of 2012, which was around 1m (3') deep, Sue noticed that her business recovered quite quickly and believes that this was because she had solid wood cladding on the walls (which were coated in Yacht varnish) and so she was able to wash down and reuse it. After this flood Sue installed flood barriers to the front and back doors.

The flood of December 2015 was over 2m (6') deep and the flood barriers were overtopped. Unfortunately the barriers worked so well in reverse that they kept the water inside the building after the flood had receded outside!

The pressure of the flood water inside caused the windows to blow outwards when the flood receded.

The pressure from this caused the windows to blow outwards. Sue says she was incredibly lucky, as a nearby hairdressers that had not flooded, allowed her to run her business from there. Had she not been able to do that, she would have had no income for the 9 months it took to repair her salon. The insurance bill was about £30,000 and sadly after this flood, Sue was unable to obtain any flood insurance.

After the 2015 flood Sue and her landlord, who was very supportive, decided that the only way forward was to build back better and make the salon resilient for future floods. Her landlord paid for the building works and Sue financed all the internal fittings, which came to approximately £8,000.

A plastic kitchen was installed.

Stone flagged floor and the walls have a plastic membrane from floor to ceiling, with cement render over the top.

The measures taken were:

- Stone flagged floor, using waterproof adhesive and grout.
- The walls had plastic membrane from floor to ceiling, with cement render over the top.
- Waterproof paint was used on the walls (the same kind of paint that is normally used externally).
- Non-return valve fitted to the drains.
- A plastic kitchen was installed.
- Plastic door architraves and cheap, sacrificial doors.
- All internal fittings were either reinforced glass (for the shelving), steel or plastic.
- The waiting area chairs are metal garden chairs.
- Sacrificial upcycled furniture.
- Plug sockets sited 120cm (4') up the walls.
- Hairdryers attached high on the walls.
- Electric meter and fuse box sited high up.
- Plastic mirrors.

The flood of February 2020 happened on a Sunday. Sue was able to power wash everything and put industrial strength dehumidifiers and a powerful gas heater in place, which enabled her to open for business again at 9am on the following Friday. Sue had no insurance - but did have a savings fund to put towards flood damage recovery. Her only losses were lower level stock, (which she was unable to move due to the flood arriving very quickly) the waiting chair cushions and her second-hand reception desk; The total bill for her losses came to under £1,000!

Sue is now a firm believer that adapting a property to enable it to recover quickly from a flood is the 'way to go' and encourages everyone at risk to do the same!

Plastic door architraves and cheap, sacrificial doors.

Hairdryers high on the walls and plastic mirrors.

Electric meter and fuse box sited high up.

Sacrificial upcycled furniture.

Vegan bar in Hebden Bridge

Vegan restaurant
Flooded 2015, 2017 & 2020

These premises were known to have been previously flooded, as recently as 2015, when the current proprietor took over in 2017.

As part of the works required to make the building suitable for a catering business, flood resilience measures were included. This decision was taken because it would allow the business to recover quickly from a flood, whilst also ensuring that flood insurance was obtainable (quite rare in the area).

Work surfaces, bar and serving counter are concrete.

Walls stencilled and painted to resemble tiling.

The measures taken:

- All floors are now solid concrete with a membrane underneath, and sealed to allow it to be wiped down.
- Walls - membrane extends from under the floor to one metre up the wall, then concrete coated and painted to resemble tiles.
- All the work surfaces, bar and serving counter are concrete.
- Kitchen is stainless steel and can be hosed down.
- Kitchen floor has tiles, affixed with waterproof adhesive and finished with waterproof grouting.
- Electrical sockets have been raised.
- Window replaced with a new one, with concrete below it.

The business also has flood barriers for the doorways.

Waterproof membrane during installation.

Tiled kitchen floor with waterproof adhesive and grout.

2020 UPDATE

The builder who installed the recoverable repair has confirmed that the bar was open for business in less than a week after being flooded again in February!

Kitchen is stainless steel and can be hosed down.

Boat House in Yalding

Wooden constructed pub Flooded 2000

The Boat House pub has flooded on quite a few occasions, but it is not possible to adapt the property because it is a listed building.

In the face of this restriction, a new extension has been built at a raised level.

Flood resilient repairs entailed:

- The floors have all been tiled.
- The fixtures are made of old reclaimed wood, which can be washed and salvaged.
- The walls have waterproof plaster.
- Plug sockets are sited higher up the wall.
- Flood barriers to all the doors, which are fitted on receipt of a flood warning.
- Large permeable paved area outside.

Large permeable paved area outside.

The floors have all been tiled.

The floors have all been tiled.

The fixtures are made of old reclaimed wood, which can be washed and salvaged.

The Harbour Inn in Southwold, Suffolk

Old fisherman's pub Flooded 2013 & 2019

The Harbour Inn is below sea level and floods regularly, especially during the months of October- February. Nick Attfield, who is the area manager for the local brewery told me how he manages that risk. The Inn flooded in 2019 and because of the plans he has in place, was able to open the next day.

The tidal surge of 2013 flooded the lower bar quite deeply and even then, they were only shut for 4/5 weeks whilst it dried out. Nick relies heavily on Environment Agency flood warnings and said they were incredibly accurate, especially telling him how deep the water will get. He also finds the app 'the National Tidal & Sea Level Facility' very useful. The kitchen is at the lowest point, so armed with this knowledge and years of experience, Nick can decide whether to move kitchen equipment to a higher part of the inn, or move everything in to his brewery van to take it to a safe place. Then it's all hands on deck to deep clean the inn and get ready to open again.

Nick just prepares the Inn and lets the water in and then he lets it out.

The Inn flooded in 2019 and because of the plans it has in place, was able to open the next day.

So, what has Nick done?

- The inn has tiled floors that can be washed down. Any tiles that 'pop out' are easily relaid and grouted by a local tradesman.
- The bar is made of marine ply.
- The tables and seating are made of hardwood and can be hosed down.
- All kitchen equipment is on wheels and can be moved easily. Some are also sited on crates so that in a lower flood, they don't need moving.
- The electricity and gas supply are high up and can be easily turned off and back on.
- The toilets are all tiled and can be washed down afterwards.
- They have their own sewage treatment system and are treated as top priority by a local company, who will come and empty it at short notice to prevent it 'backing up'.

Nick has worked with the Brewery Insurance company and has managed to retain flood insurance. He agreed to pay a percentage of every flood claim, which incentivises him to do everything possible not to make a claim. He hasn't made an insurance claim in over 6 years!

The tables and seating are made of hardwood and can be hosed down, as can the tiled floor.

Top Tip

Experience has taught Nick to not try to keep the water out; it is too powerful and can cause a lot of damage. Now, he prepares the inn and lets the water flow in and then out again.

The first few steps can be easily removed to make space for moving kitchen equipment to a higher part of the Inn.

The bar is made of marine ply.

The electricity and gas supply are high up and can be easily turned off and back on.

Some kitchen equipment is sited on crates.

Kitchen equipment is on wheels and can be moved easily.

The toilets are all tiled and can be washed down.

Shared office block in central York

Modern office building Flooded 2015

The River Foss is only 10 metres away from this office block complex and underground car park.

It is shared by more than a dozen different companies and was flooded to a depth of 30cm (1') in the internal lobby and lift areas, during Storm Desmond in December 2015. Maclaren Loss Adjusters and Quantum Survey & Project Management oversaw the reinstatement works on the building. Following advice from the Association of British Insurers, they decided to reinstate the building to make it resilient to future flooding. They were able to utilise government grants, that each individual tenant was able to apply for, to help future proof the offices and car park.

Resilience work included

- Replacing entrance lobby floors with non-slip ceramic tiles, adhered with waterproof adhesive and grout.
- UPVC skirting boards.
- UPVC door architraves.
- Raised fused spur for heating systems, with wiring coming down from the floor above.
- The lower section of walls was re-plastered using a breathable renovating plaster instead of standard plasterboard.
- Flood barriers to all the lift entrances.
- Flood barriers to all the doors.
- Flood barriers fitted around the cooling system plant.
- Non-return valves to drains.
- 2 puddle pumps to help with the removal of water, if needed in the future.

Flood barriers to all doors and UPVC door architraves.

The lower section of the wall was re-plastered using a breathable renovating plaster.

Flood barriers to all the lift entrances.

2 puddle pumps to help with the removal of water.

UPVC skirting boards.

Red Tower Community Centre in York

Part of York City walls Flooded 2015

The Red Tower is a community centre, part of York's city walls and is grade 1 listed.

It is run by a community interest company, who hold events to provide cooked meals for those that are struggling, with food being donated by local supermarkets. They also run events during the school holidays, to ensure that those children who are entitled to free school dinners, can gain access to a good meal.

As the tower is very old, it has suffered lots of flooding, but Boxing Day 2015 saw flood water rise to a height of 1.5m (5'). As a result, the CIC decided to employ the services of a specialist local architect to make it flood resilient and use it as an example of what can be achieved.

- Walls that have survived previous floods are left bare brick.
- Floors covered with self-levelling screed and coated with floor paint.
- Eco concrete work tops made from recycled material.
- Removable free standing kitchen units on wheels.
- Steel staircase with powder coated finish.
- Glazed sliding door/screen in powder-coated steel.
- Staircase treads in solid oak.
- WC enclosure constructed in metal studwork and clad in fibre cement boarding. Door is fabricated in powder coated steel also.
- Storage cupboard clad in fibre cement boarding.

- Sockets, switches and electrical fixtures and fittings moved to high level. All cabling now housed in conduits and feeds down from above, to a minimum height of 1.4m above ground level. Electric sockets, switches and electrical fixtures such as water boilers fitted at that level also.
- Non-return valve fitted to external inspection chamber to prevent the backfilling of waste pipe/wc pan further up the system in the event of a flood.
- New window frames are in oak.

Glazed sliding door/screen in powder-coated steel.

IMAGE: KENNY BROWN

Removable free standing kitchen units on wheels.

IMAGE: BARRY BECKWITH

Raised electrics with with drops from ceiling level.

IMAGE: KENNY BROWN

Steel staircase and solid oak treads.

Community volunteers

Communities at risk play an important role in helping to manage flood risk in their area. Many people who work tirelessly, on a voluntary basis are the 'eyes and ears' on the ground, supporting the Agencies responsibly for Flood Risk Management.

This section highlights the work of a few communities.

Churchtown Flood Action Group

Churchtown is a small village of approximately 84 houses in Lancashire. It is bordered on three sides by two rivers - to the East is the River Wyre, and to the West a smaller, but no less significant river, the Ainspool. Both rivers have been enclosed by embankments - the Wyre after a flood similar to Storm Desmond in 1980, and the Ainspool in 1987.

During and immediately after Storm Desmond, no Flood Risk Management Authority or any Emergency Vehicles came to Churchtown to help, as the flooding throughout Lancashire was too widespread. Unfortunately, just eight months later the second serious flooding of Churchtown occurred. Again, we were in desperate need of help and, although the situation had changed and we did receive some practical help, the village's flood defences at that point were more or less the same as they has been eight months previously. The Flood Action Group decided that our only course of action was to try and raise the money ourselves to build a 'DIY' flood defence.

The idea for an embankment originated from two of the residents, who come from several generations of farmers living alongside the two rivers and therefore understood what needed to be done. Wyre Borough Council provided the FLAG with a useful topographical study and after a preliminary design and costings had been made (which indicated it would cost in the region of £100,000 to build) the group applied (unsuccessfully) to the Prince's Trust and the Community Foundation for Lancashire for funding. However, following discussions with the Chief Engineer of Wyre Borough Council, we found there was an alternative in the form of funding from the Grant-in-Aid/ Local Levy from the Environment Agency (hereafter EA).

The Wyre area 'Making Space for Water' technical group met in March of 2018 and Paul Bond (of the EA) presented the project to them on our behalf. They unanimously agreed to help us, and several meetings and site meetings were arranged involving the EA, FLAG, Wyre Borough Council Engineers Department and the legal department of Wyre and the EA. This time we were successful in obtaining Grant in Aid funds.

Before we could begin building, we also needed a favourable business case and a Bespoke permit from the EA, the application for which had to include both a Flood Risk Assessment and a modelling report.

Although the weather in the summer of 2018 was excellent, the delay caused by the need for the Bespoke permit meant that the weather became inclement before the project was completely finished (although the clay core embankment was constructed within six weeks). The remaining portion of the Flood Defence is to be built of pre cast concrete blocks around Mill House, which is located adjacent to the river bank. There is also a flood gate across their entrance and wing walls created, to tie the brick and clay wall defences together. We hope to complete the work by the end of March 2019, and have invited the Duke of Westminster to open it on the 22nd of August 2019 (this being the anniversary of the flood in Churchtown that occurred after Storm Desmond).

In addition to Churchtown FLAG building their own flood defence, the Group has already raised sufficient funds to:

- Write a history of the flooding of Churchtown from 1980 – this was distributed (via our MP) to all our local FRMAS and Government Ministers.
- Stage a very successful Conference at Myerscough College, to inform the residents in the area of their flood risk.
- Identify vulnerable residents.
- Appoint Flood Wardens and equip them all with water-proof torches, waders and hi-vis jackets.
- Formulate an Early Warning system.
- Purchase 18 grit-bins which have been distributed around the village filled by (Wyre BC with sandbags) plus plastic sheeting.
- Campaign to purchase, and now have access to, two powerful portable pumps.
- Contribute to a pumping strategy.
- Contribute information to three Government reviews and enquiries.
- Contribute with our partners, the EA and the Wyre Rivers Trust to research into the installation of Leaky Dams and attenuation ponds on the Ainspool River (due for completion during the next year).
- Write to all 200 plus Lancashire Parish Councils and 16 Lancashire MPs in an effort to encourage them to meet regularly and coordinate their approach to flooding in rural Lancashire.
- Our Chairman meets regularly with the Wyre Water Catchment Partnership
- Churchtown FLAG members have supported other FLAGs in the area by attending inaugural meetings, providing them with our constitution, etc
- Committee members have attended the NWRFCC North West Regional Flood and Coastal committee.
- The FLAG regularly attends The Wyre Flood Forum in an effort to keep Churchtown's Flooding issues at the forefront of any planning/ action to be taken.
- The FLAG meets every month and issues regular news letters, and the members administer the Churchtown Flood Action Site and Lancashire Flood Action Groups on Facebook.
- Produced a film of the August 2016 flooding - https:/ vimeo.com/ 182401287 password Flood. This has been requested by a number of FRMAs as a learning tool.

- The Churchtown FLAG entered and was successful in winning a competition this year - 'The Project Excellence Award for Community Leadership' organised by the EA. It was presented at the EA conference in March by Emma Howard Boyd (Chair of the Environment Agency).
- Organised a 'Meet and Greet ' information evening for all the new residents who had bought houses after Storm Desmond.
- Supported Liverpool and UCLAN students and with their degree and higher degree dissertations based on the Churchtown flooding experience.
- Provided Lancashire University Staff with a research proposal into the relationship between insurance companies and flood victims.

Top Tip

Leaky Dams are one of a number of Natural Flood Management solutions that can be constructed. Communities can consider if NFM could help reduce the amount of flooding for them.

Without the hard work and commitment of so many members of our community (too many to name for reasons of space) we wouldn't have been able to achieve all the above results. The village is extremely grateful and, combined with the residents own installed resilience, this is now one of the most protected communities in Lancashire.

Todmorden Flood Group

Mission statement

Our purpose is to work for the benefit of the individuals, businesses and communities in Todmorden who are or may be affected by flooding.

Following the events of June 2012, the group formed in September 2012 and became established as a community group via a written constitution in February 2013. Membership is open to everyone affected by flooding, or is willing to help for the benefit of our community. Meetings take place on a regular basis at Todmorden Resource Centre.

How the Todmorden Flood Group fulfils community needs:

- We have formed a good working relationship with all agencies who manage flood risk (Calderdale Metropolitan Borough Council, Environment Agency, Yorkshire Water and other services) and share with them concerns of our community.
- Liaise with services about proposed flood risk management measures.
- Provide information on the states of rivers, culverts etc. both before and after a flood event to local residents.
- Collaborate with services to draw up local flood plans.
- Establish sites for flood stores and stock them accordingly.
- Represent community issues at meetings and discussions about wider issues affecting the Upper Calder Valley.
- Report back to TFG and residents of Todmorden on the impact of flooding.
- Hold an AGM and a 'dry run' once a year, to allow residents to have contact with TFG outside scheduled meetings.

Next steps of action:

- Promote personal responsibility of householders and businesses (including landlords) for flood resilience to their own properties/premises.
- Continue to liaison with the EA and CMBC for the benefit of communities within Todmorden.
- Identify flood volunteers.
- Hold a 'dry run' once a year to rehearse the flood plans.
- Continue to work with service providers and communicate the benefits and shortcomings of their proposals to the wider community.

IMAGE: TONY PICK PHOTOGRAPHY

Snape Community Emergency Planning Group

Many Snape residents took advantage of the government £5k grants and had property flood resilience products fitted to their homes. What is striking about this group is how the community has come together to form an emergency plan.

The 5th December 2013 is a date that people in the village of Snape, and many others on the east coast of England, will remember for many years to come. A tidal surge devastated homes and businesses in parts of Snape, as well as many other places across Suffolk and Norfolk. This left our community feeling that something had to be done to prepare for future events - although many people naturally offered help and support to those who had been flooded, and many people in the village were aware they were at some risk of flooding, it was obvious to many of us that the overall response could have been better coordinated.

A number of Parish events were held over the next few months, during which some residents and victims of flooding met with the Council emergency planners and the Environment Agency. It was agreed that the village needed to construct its own Emergency Plan, organised by a small group of volunteers from the village, but with the support of these organisations.

One of the most important pieces of work was the creation of a questionnaire to identify what skills and resources were available locally. Over 40 responses were returned from the 300 questionnaires and we learned that there were residents with first aid qualifications, access to alternative communication systems, boats, chain saws, and 4x4 vehicles, all of whom were more than willing to offer help! Many others were willing to offer emergency accommodation, and help in staffing an emergency centre, providing drinks and other refreshments if required.

We had a formal launch of the emergency plan on the first anniversary of the flooding, which got significant coverage in the local media. Since that initial work we have also applied to have the village hall fitted with a telephone line, an internet connection and an emergency power external connection, in case there is a significant power loss in future. Much of that money for this has come from local fund raising. In early 2016 we recirculated the questionnaires and guidance leaflets, and reviewed the plan by re-contacting all of the volunteers to check that they were still available. The plan will be run in future by local volunteer co-ordinators, who will liaise with the Emergency Services, advising them on what support is needed and by whom. They will also provide immediate local support to residents whenever possible.

Other actions have included:

- One local resident and Parish Council member has also worked to refresh the Snape village website, which now contains a live link to the Environment Agency information on tides and flooding as well details of the local volunteer group.
- The East Suffolk Internal Drainage Board undertook repairs to the Snape Village wall in the immediate aftermath of the flooding and carried out additional work through 2015 to strengthen the defences.
- There is also work being coordinated by the Alde and Ore Estuary Partnership, to improve flood defences both at Snape and at other locations along the length of the river including Aldeburgh.

In January 2017, following another east coast surge warning and evacuations being advised, we agreed with the Suffolk Joint Emergency Planning Unit (JEPU) to activate our own local plan, assisting with providing warnings and opening the village hall as an emergency centre. Members of the team and others from the village set up the hall with rest spaces, food, drinks, together with local plans and information to assist the police and coastguards. The centre was swiftly adopted as a control centre for the emergency services themselves - in all, we had up to 50 people on the premises. We also hosted the local radio and journalists through the night. Happily the surge fell just below the anticipated peak, so there was no flooding of homes on this occasion, but it did give us the opportunity to exercise the plan.

Clementhorpe, York - emergency plan for the area

York experienced severe flooding on Boxing Day 2015. The flooding was caused by extreme wet weather causing high river levels on both the Foss and the Ouse. At the Foss barrier the volume of water exceeded and overwhelmed the capacity of the existing pumps. The subsequent independent inquiry found that the decision to raise the Foss barrier prevented rapid, deeper and more extensive flooding in the Foss catchment.

The River Ouse also flooded and was due to peak on 27th December at around 5.4m above normal summer levels. This would have endangered a large number of houses in the Clementhorpe Area. In the event, the flood waters did not reach this record level.

It was very apparent on Boxing Day 2015 that the focus of people's attention was the extensive flooding from the River Foss. Inevitably resources were being put into helping the hundreds of affected properties, not on the River Ouse flooding. To a large extent, the residents of Clementhorpe were left to their own devices to deal with the risks to their properties, but the local community rallied round and were there in numbers to help out. Both residents and volunteers 'mucked in' doing what they could to try to protect the properties - shifting sand bags, filling vents with expanding foam, moving elderly people to safe houses, and fabricating wooden barriers and plastic sheeting at doorways. At one point there were over a hundred local people shifting sand bags alongside soldiers who had been drafted in to build up the Lower Ebor Street flood defences.

The Clementhorpe residents were very grateful for all the help they received, but a special mention is due to a wonderful group of about 15 people from a Batley Mosque. They got into the Mosque's minibus and drove to York to help where they could, complete with canoes and a huge amount of enthusiasm to help our Community in its hour of need. Their help was so gratefully received and their efforts made the difference for a number of properties.

Since the Boxing Day floods, York is benefiting from a £17 million upgrading of the Foss Barrier, with a further £45 million of Government funding to be invested in other schemes to reduce the impact of flooding. A series of major flood defences is now planned for the area.

The Clementhorpe Community, however, is doing its best to be prepared for any future flooding through its own efforts:

- Around 10 local residents have formed the Clementhorpe Emergency Planning Group which is based at Clementhorpe Community Centre with the aim being prepared for possible future emergencies.
- The group is also trying to raise awareness of how the community can be prepared for future flooding.
- The Clementhorpe Emergency Group, with the help of the city's Emergency Planning Officers, have put together an emergency plan which in the event of an emergency will help coordinate the local response.
- The group aims to distribute leaflets around the area, to give residents helpful advice and set up emergency information action points to help those at risk and to help raise awareness of what individuals and neighbourhoods can do to help themselves.
- The group is hoping to install flood level markers around the area, to give a clear indication of how high previous floods have been. It is hoped this will produce further publicity, and help raise awareness of local residents to prepare for flooding.
- The group have put forward a draft design for these markers, which is to be considered by the Environment Agency and City of York Council before being fitted on walls around Clementhorpe.

Storm Desmond in Corbridge

The worst recorded flood event from the River Tyne in Corbridge has been in 1771 – until Storm Desmond arrived in December 2015. 13 inches of rain fell in 24 hours and, coming on top of the preceding two months' heavy rain, our community of 52 dwellings experienced 24 hours of severe flooding and a week of road and rail-related flooding. Few of us expected it and several of us did not evacuate because we thought the recently completed flood defences would protect us. We were familiar with the warning system and all aware that we live in a flood risk area, but nonetheless we were shocked to be flooded.

The flood was made worse by two factors – firstly, the degraded Victorian infrastructure and secondly, upstream storage. We hadn't given much thought to the impact of the local water drainage system but during Storm Desmond it lacked the capacity for water run-off and the damaged drains and culverts meant there was nowhere for the over flowing river and rain to go. People that stayed in their homes described water slapping at the front and then thumping at the back at it ebbed and flowed around the houses. Meanwhile, Kielder reservoir which is 30 miles upstream of us, is constantly kept at 'almost full'. This was discharging excess rainfall into the river, increasing the volume of water by 3 percent, which was enough to add significantly to our experience of flooding.

At its worst of the flood water was over a metre high in our homes. The damage was extensive, and there was a mass exodus as we were forced to leave our homes with all normal life disrupted. The displacement and the rebuilding were challenging for all of us. However, we have a very strong community and a history of working together on flood defences, so we were well equipped to support each other. Not only were we quick off the mark to organise community meetings with the MP, the Parish Council, the Council, the Environment Agency, the Water Authority and the police – all of whom helped enormously, but we also made sure an experienced counsellor in our community contacted people to offer psychological support. A researcher from Durham University, specialising in flood communications, set up a research project and six of our community met regularly to understand the pattern of flooding and address the communication systems. The material support helped a lot - we had free skips from the council, visits from the MP, the chair of the parish council and a bus load of 'labourers' from Sage (a local business) who rebuilt walls, moved furniture, retuned televisions and generally cleared up the flotsam and debris left by the floods. All of this helped us stay strong during the reconstruction period.

Alongside rebuilding our homes, we worked together with officials to fix the public infrastructure with the drains, road and gullies all drastically reconstructed. With the aid of our MP we managed to change the operating agreement to run the reservoir at a lower level in the winter months, so that when biblical style rains come the reservoir can absorb the extra water and prevent it going down the Tyne. This takes around 10% of all water going past Corbridge out of the game.

We were all home within the year and were able to mark the occasion with a party in the local pub. Nobody wants to be flooded again and none of us will be as complacent as we were in 2015, but we live in a stunning area of natural beauty, our soil is intensely fertile, we have a wonderful community spirit and we are known not for the flood but for how we have coped with it – and for that we are grateful.

Shipston Area Flood Action Group

Shipston has a long history of flooding including events in 1947, 1968, 1979, 1998 and twice in the severe flooding of 2007. Flooding has also occurred to homes in 2012, 2013 and 2016. The causes are a combination of flooding from watercourses, and severe rainfall events creating surface water runoff resulting in flash flooding.

The Warwickshire Stour catchment (187 km2 in area) is mainly characterised by agricultural land, with 36 tributaries flowing into the River Stour. The high proportion of cultivated land creates considerable run-off, which flows quickly down through the catchment, until it meets a 'bottle neck'. This contributes to flooding of the town of Shipston-on-Stour, as well as numerous villages located next to the river.

The Shipston Area Flood Action Group (SAFAG) formed in February 2014 as part of a Pathfinder Programme under the auspices of the National Flood Forum (NFF). A committee was established, many members of which were flood victims and also retired former business people. As we are not large landowners or farmers, we had to experience a significant learning curve as we progressed! As a pressure group, however, we found we had greater strengths than as individual flood victims, (where all we achieved was 'sympathy and sandbags'). Persistence, strong leadership and a determination not to take 'no' for an answer resulted in a number of achievements, including a review and improvement to the maintenance programme of the ancient drainage system in Shipston town centre. Severn Trent also upgraded the capacity of the pumping station in Newbold on Stour (which pumped raw sewage into the River Stour at times of abnormally high rainfall).

We already knew, however, that hard engineering solutions to resolve all our flooding problems would not be an option, due to the cost/benefit ratios involved. Instead, we chose to follow the Natural Flood Management (NFM) route, which typically uses natural materials to reduce run off, thus 'slowing the flow' to delay the effects of heavy rainfall that cause flooding. These techniques are not only environmentally friendly but are significantly less expensive than hard engineering solutions. We paid visits to established schemes in North Wales, North Yorkshire, Stroud in Gloucestershire, Witney and Shipton under Wychwood in Oxfordshire.

Coventry University aided us in developing project plans for the area using NFM. SAFAG then proposed, assessed and has now commenced a major NFM programme, to address local flooding issues from both fluvial and pluvial sources. Thanks to the huge support of farmers/landowners and with the dedicated work of local volunteers and a Project Officer from Coventry University, over 360 (NFM) interventions were installed across approximately half of the Stour catchment area by the end of August 2018. A comprehensive monitoring programme is also in place. This has been a 2 year initiative, driven by a dedicated team, with widespread community support. It has been made possible by an EA/DEFRA grant of £145k, together with wider SAFAG fundraising and significant volunteer work from the flood group members, which has covered all the costs involved.

SAFAG is aiming to install a further 600 NFM interventions across the remaining areas upstream of Shipston-on-Stour by the end of 2020.

IMAGE: IAN THOMPSON

Datchet Flood Group

Local flood risk management and resilience measures were stepped up considerably following the flooding in Winter 2013/14. The Datchet Flood Group was established and is comprised of local community volunteers led by Ian Thompson, Datchet Parish Council (DPC) Spokesperson for Flooding.

Details of the Flood Group and its activities can be found on the Datchet Parish Council website and we welcome volunteer to join and attend meetings held periodically in the Datchet Parish Council Office.

A detailed community flood plan compiled by the local community and reviewed periodically is in place. We have a flood recovery team which comprises of Flood Wardens and Flood Marshals who are all members of the Datchet Flood Group.

The Flood Group works closely with the Environment Agency (EA), the Royal Borough of Windsor and Maidenhead (RBWM), Thames Water etc, as well as other local flood-vulnerable communities in the Thames Valley to share ideas, experiences and lessons learned, and best practice in flood risk management. Collaboration has extended as far afield as Russia and the Netherlands. General community awareness raising is ongoing and has included drop in exhibitions by the EA and we have distributed Flood Awareness leaflet to each household in the Parish. There is also a website, developed by the local community, providing general advice and guidance on flooding.

Flooding is a regular agenda item at each monthly DPC meeting. We raise awareness and support the community with information regarding insurance issues, including the Flood Re scheme for residential property and the BIBA flood scheme for small businesses.

Improvements to flood risk reduction since 2014 floods have included:

- Replacement of Flood Defence Bunds at Eton End School.
- Maintenance of the drainage system in the village, including the central barrel arch.
- Statistical analysis of the Jubilee River flow.
- Datchet Common Brook – prevention of backflow.
- A full 'dry run' rehearsal of the community flood plan.
- We formed a flood working group, together with the EA, to deal with outstanding residual risks that we are aware of.

IMAGE: IAN THOMPSON

Patterdale Parish Community Flood Group

The Patterdale Parish Community Flood Group was set up in response to the floods caused by Storm Desmond in December 2015. This had a devastating impact across the areas of Glenridding, Patterdale, Hartsop and Deepdale.

Following a month of heavy rainfall, the full force of Storm Desmond hit Glenridding on the afternoon of Saturday 5th December 2015. Frantic efforts to protect homes and businesses proved fruitless as the full devastating impact of the storm hit. Glenridding Beck overflowed its banks in the village in the early evening and the next morning was flowing freely down Eagle Lane, across the car park, and right through the Glenridding Hotel. The flood water brought with it thousands of tonnes of silt, gravel and stone, all carried down the fells from landslips all the way up to Helvellyn. The village was cut off by road for three days in both directions, with no phone lines, intermittent power, and no mains water.

It was clear from the start that no external help was going to arrive, and so a group of local residents joined together to start work on the clean-up. Aided by the heroic efforts of local contractors, including Rob Butler from Beckside Construction and O'Malleys, they set about clearing out the becks, and cleaning up the properties and businesses which had been inundated. Over 20,000 tonnes of gravel and stone was removed from Glenridding Beck just from the village hall to the lake shore. By the time the Environment Agency and Cumbria County Council arrived, the work was already well underway. Despite further setbacks, including another significant flood on the evening of Wednesday 9th December, the recovery continued throughout December and into January.

The core group of volunteers morphed into the Community Flood Group and continued to direct efforts during the recovery throughout 2016 and 2017, including raising considerable funds to pay for necessary work outside the remit of the government agencies. Over 70 specific areas needing action were identified and sorted, ranging from the flooding of individual homes to the repair of beck walls and gravel clearance. The flood group was organised into four main areas, focusing on emergency planning, property level flood defences, maintenance activities, and upstream flood resilience measures. The Environment Agency finally completed the flood defence wall in Glenridding in April 2019 – over 170 weeks after Desmond occurred.

The flood group worked with individual homeowners and businesses to improve their own flood resilience, and assisted in obtaining grants to fund this. A community emergency plan was developed to ensure the most vulnerable in the community were looked after. Communication plans were also put in place, and emergency stores set up in key locations. In addition, working with the relevant agencies and local landowners, they developed flood resilience schemes upstream on the many becks that feed Ullswater through the Dale. This work, varying from gravel clearance to tree planting and beck bank repair, is still ongoing. The group also funded a local contractor, Carl Scrivens, to work as a Parish Lengthsman, who now ensures the drains, gullies and ditches are kept running freely. Carl worked tirelessly from the very first day on the flood recovery work and was rewarded with a British Empire Medal in the New Year honours in 2017. He continues in his role as Parish Lengthsman to this day – his work now funded by the Parish Council.

IMAGES PROVIDED BY: ROB SHEPHARD

Property Flood Resilience

MDA Flood Resilience Consultants in partnership with Environment Agency FLOODRE NFU Mutual

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