

---

# Approaches to building flood resilience for Communities

A Worcestershire case study exploring issues and opportunities for  
the historic environment in relation to flooding

---



## Summary

In 2014/15 Historic England commissioned Worcestershire Archive and Archaeology Service, in collaboration with Dr Andy Howard of *Landscape Research and Management*, and community and organisational partners, to investigate the direct and indirect effects of flooding, to the county's historic environment and landscape character. A key recommendation of the project was the need to further investigate how the historic environment profession can better engage with communities and individuals looking to build resilience and plan for future flood events.

This report further investigates the relationships between historic environment professionals, communities and 'hard to reach' groups, including insurance companies, loss adjustors, structural engineers and building contractors. The issues highlighted, through surveys and communications, are laid out alongside case studies of, and opportunities for, good practice.

The surveys, discussions with local communities and examples of existing projects, show that there is a lot that can be achieved in terms of empowering communities to build resilience for the future, and a lot that the historic environment profession can do to support this. At an individual building level there are problems with a lack of understanding of traditional construction methods by many of the parties pushing for property-level interventions. The historic environment profession needs to disseminate our knowledge and advice in better ways because the evidence shows that the owners and custodians of these properties are keen to receive it. On a wider scale whole-catchment projects offer an opportunity for communities to be involved in reducing and mitigating flood risk through enhancement of the natural and historic environment.

## Introduction

Flooding has devastated many settlements in Worcestershire, bringing with it millions of pounds worth of damage as well as emotional, physical and financial stress for those individuals and communities affected by it.

Climate change predictions, exacerbated by changes in land use, including development in vulnerable areas and the hard surfacing of green spaces, indicate that flooding events related to surface, river and coastal flooding are likely to become more frequent. In response many communities are recognising the need to create flood-resilient<sup>1</sup> places that can better respond to, and recover from, the impact of flooding.

The impacts on the historic environment are often, understandably, overlooked when focussing on flood resilience or resistance, but there are a number of ways that working with the historic environment and the natural environment, more broadly, can improve and enhance schemes.

A 2014 survey of residents in five areas, across Worcestershire, impacted by flooding (Tenbury, Sedgeberrow, Childswickham, Kempsey and Wribbenhall) highlighted a number of key areas where the historic environment profession could potentially work more closely with communities.

The surveys and public consultation established that the insurance companies, loss adjustors, structural engineers and building contractors, who work with home owners and land managers, after flood events, are often unaware of the constraints and needs of historic structures. A better understanding of how to

repair historic fabric and the best methods of building resilience for the future is needed. The profession needs to target this group, but a better understanding of what is required must be undertaken, before documentation is produced.

Enhanced support is also needed for community groups who are looking to build resilience, on a landscape or village-scale. Building on the work carried out in the previous consultation and survey work, this piece of work aims to establish how best we can provide that support and advice to community groups.

## Methodology

This project began with a survey of those who have undertaken flood repair or resilience measures within the last 10 years (see Appendix).

Approximately 60 historic property owners including small business owners, builders, flood specialists and loss adjustors, who have dealt directly with flood repair or resilience projects, were invited to participate in an online survey *'Flooding and Historic Buildings'*. The British Damage Management Association (BDMA) and the Institute of Historic Building Conservation (IHBC) were consulted separately. Contact details for individuals and companies were acquired through word of mouth (in-particular through community consultation during the original 2014/15 project) and as a result of internet searching.

We were aiming to get responses from a range of perspectives including, specialist damage management contractors, insurance assessors, loss adjustors, general building contractors, surveyors/architects and property owners. **We failed to elicit any responses from specialist contractors or insurance assessors**, but we did manage to get responses from surveyors who had worked closely with these professions. Perhaps the lack of response from these groups

---

<sup>1</sup> Flood resilience is here defined broadly as the ability of an individual or community to prepare for, respond to, and recover from a flood event. *Resilience measures* in relation to buildings, property or structures are defined as those that do not attempt to prevent flooding, but enable the structure to survive the flood with minimal impact. *Resistance* measures are those that attempt to prevent or slow water-ingress into buildings and structures, such as flood doors, non-return valves and drain covers.

indicates a lack of interest in engaging with the historic environment?

The survey was followed up by more detailed questions and telephone discussions with respondents who provided contact information.

Alongside this, further consultation with community groups in Sedgeberrow and Wribbenhall was undertaken, looking at the potential for communities to be involved in large-scale projects that deliver multi-disciplinary benefits. Case studies looking at how exemplar projects elsewhere could be applied in Worcestershire were discussed, and the potential benefits outlined.

## Survey Results

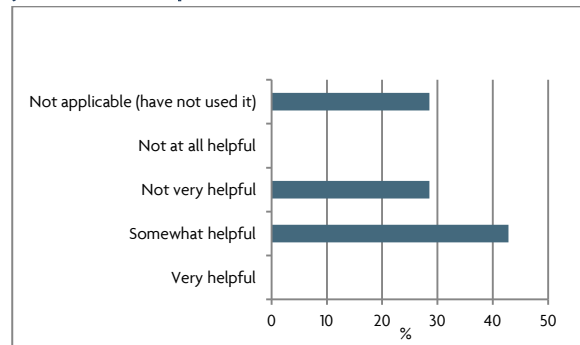
29% of respondents were property owners, 14% were small business owners and 57% surveyors or architects. **There were no responses from specialist damage management contractors, general building contractors, insurance assessors or loss adjusters**, although one participant had previously worked in the insurance sector for 5 years and was able to offer insight into the profession.

Of the participants questioned 57% were very confident and 43% were somewhat confident that they understood the legal framework regarding listed and scheduled structures and conservation areas, including when consent might be required and where to go for advice and support (of the 57% who were 'very confident' 50% were owners of an historic building and 50% were surveyors/architects who have been involved in flood repairs/resilience. Of the 43% who were 'somewhat confident' 67% were surveyors/architects who have been involved in flood repairs/resilience and 33% were small business owners).

86% have confidence that they know the best options for the repair of historic buildings after flood events, or that they know how to find

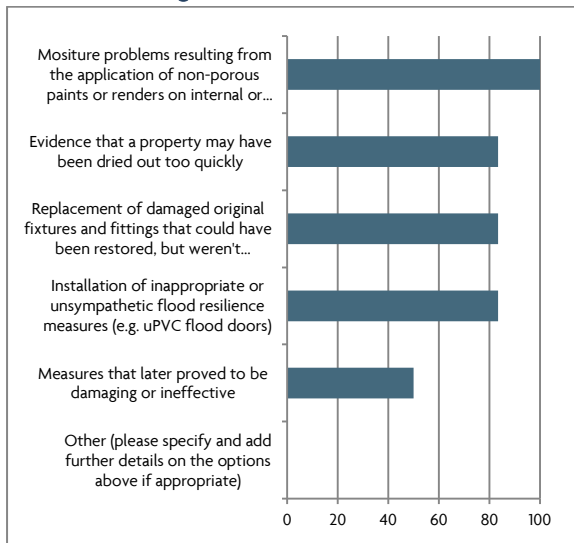
specialist contractors and have confidence in their ability.

## Question 5: If you have used Historic England's guidance on flooding and historic buildings, did you find it helpful?



Although over three quarters of participants were aware of Historic England's guidance on flooding and historic buildings, only 57% had actually consulted the guidance and only 43% had felt it somewhat helpful. 29% of respondents felt that it was 'not very helpful'; one participant (a surveyor/architect) stated that the guidance was 'not applicable'. It is interesting to note that three quarters of participants in this survey, targeted predominantly towards surveyors and architects, were aware of the HE guidance, whereas in the previous survey (2014), targeted generally at those living within flood risk areas, 88% had never heard of it.

**Question 8: Have you encountered any of the following problems arising from a poor response to flood damage?**



The majority of historic property owners have readily engaged with specialist craftsmen and traditional suppliers; surveyors made reference to specialist books including 'Traditional Construction for a Sustainable Future (ISBN-10: 0415467578), Period Property Manual (ISBN-10: 0857338455), Guide to the conservation of historic buildings (ISBN: 7913:2013) and BRE Good Repair Guide (ISBN: 978-1-84806-328-0). The majority of respondents (67%) had come across, what they felt, were inappropriate post-flood repairs to an unlisted historic building.

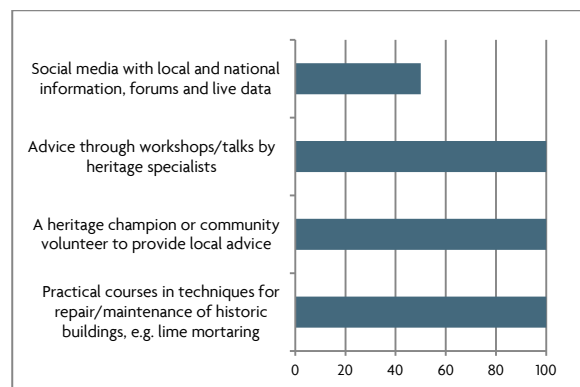
Further details of inappropriate repairs and the reasons behind them included;

- Using Gypsum Plaster, non-breathable wall paint and lead paint on timbers (owner of historic property).
- Unnecessary removal of lime plaster (surveyor/architect).
- Removal of lime plaster without justification, which was replaced with tanking slurry and damp proofing, creating irreparable damage and later damp issues (surveyor/architect).
- Applying cement based plaster and render on solid (breathable) walls (surveyor/architect).
- 'Within the sector the knowledge when dealing with specific types of buildings

is poor from all parties i.e. the insurance company, adjuster, restoration contractor, surveyor and contractor. I have come across a lot of instances whereby the post flood repairs are not appropriate' (surveyor/architect).

- In some instances the adjuster will take advice from the drying company or a 'damp proofing specialist' over a Chartered Surveyor who understands how a period property works' (surveyor/architect).
- Loss adjusters, insurers and the majority of building surveyors have not got a clue about breathability, or correct materials (surveyor/architect).
- Surveyors and people working in this area need to be properly trained and accredited. There needs to be adherence to BS 7913: Guide to conservation of historic buildings, There needs to be no further use of 'damp' meters, and a proper understanding of the proper ways of measuring moisture in walls with carbide sampling and thermo hygrometers - not resistance meters. Many Royal Institution of Chartered Surveyors (RICS) and loss adjusters use totally inappropriate resistance meters and misdiagnose damp and then specify damp proofing and unbreathable materials that are not needed.

**Question 9: From what information, advice and/or training do you feel you/your sector would benefit from?**



100% of participants felt that their sector would benefit from; practical courses in techniques for repair/maintenance of historic buildings, e.g. lime mortaring; a heritage champion or community volunteer to provide local advice; advice through workshops/talks by heritage specialists on how to care for historic buildings and appropriate measures to increasing the resilience of historic buildings to flood events. **Only 50% felt that social media, forums and live data would be of use to them.**

Further comments included;

- Many home owners don't realise that they can go and procure their own specialist surveyor, and believe that they have to go with the loss adjustor's recommendation (who is often someone from the same company who has no experience with historic buildings).
- Loss adjustors/insurers and many surveyors don't understand how solid wall buildings work.
- Loss adjustors promote hacking off plaster which is unnecessary.
- Don't automatically need de-humidifiers (Hidcote example)
- Need for talks/training/leaflets

## Follow-up questions

More detailed, questions were sent to project respondents who had left their contact information. Below are the questions, and the full responses are included in the appendix. All the responses were from architects/surveyors, so there is a clear focus in their responses to the types of material and methods of construction used in historic properties. Given the lack of response from insurers and contractors, there will be other issues that need addressing.

**Question 1: How can we raise the profile of heritage with professionals and organisations - surveyors, insurers, loss adjustors, contractors,**

**damp proofing specialists, drying companies - involved in either flood mitigation measures or cleaning, drying and repair works following a flooding event?**

- Responses to this question tended to focus on the problems within the industry, rather than how we as a profession can start to address the issues, but several suggestions were made; training courses should be provided with all of the parties involved in an insurance claim and this should be taken by a heritage surveyor who has knowledge of BS7913:2013; Training/Continuing Professional Development (CPD) sessions for local flood groups, volunteer flood wardens and other local groups; CPD on period properties and the benefits of appointing a competent surveyor who has a good understanding of the type of property.

**Question 2: How do we encourage early engagement with and the uptake of advice from accredited specialists and guidance? In what practical ways could we better promote the use of existing national and local heritage guidance? (e.g. CPD training, national forums, chartered institutes, use of social media, external websites?)**

- CPD training throughout (all parties involved) to give a better understanding and inform of the correct ways to rectify flood damaged heritage properties. CPD should be held by specialist surveyors / companies whom would carry out the correct restoration works.
- Visits to the insurance companies / loss adjustors / policyholders and help them understand period properties as essentially these are the people who make the decisions and own the properties.

- Social media. Links to online CPD etc. on social media from these messages / articles would be useful for others to access.
- Guides for policy holders would be good; this would **educate the policy holder about the construction of their property** and allow them to appoint the correct persons to survey / carry out restoration works.

**Question 3: The roles and responsibilities of different heritage agencies are often difficult to disentangle and communication ineffective. Up-to-date information and advice is often overwhelming or difficult to find online. Who do you think should facilitate – i.e. provide a hub for- heritage information?**

- Simple and clear guidance notes need to be available. **Guidance notes should agree with each other and not contradict** as currently there are views which do contradict each other, therefore causing uncertainty. The information should be provided by key websites i.e. BRE / RICS etc. Essentially this information needs to infiltrate from the top down, e.g. RICS to surveyors / insurance companies to their surveyors and contractors.

**Question 4: Do you have any examples of a best practice, multi-organisational response, to flood mitigation works or following a flood event?**

- Answers to this question focussed on poor responses and failures. **No examples of good practice were received.** Again because the responses came from architects/surveyors, the focus was on inappropriate building materials.

**Question 5: Would you like to see more training events made available for professionals involved in either flood mitigation measures or cleaning,**

**drying and repair works following a flooding event? If so what should they focus on?**

- The overwhelming response to this is yes. Responses to this question came from surveyors/architects, so the focus from their perspective is on training regarding the correct materials to use in restoration and repair.

**Question 6: Are there any other questions that you feel we should be asking to support the heritage response to flooding?**

- The responses show that the historic environment profession needs to **engage more fully with the insurance industry.** We also need to investigate the reasons that some surveyors / contractors opt not to reinstate with similar materials, and instead replace with modern materials. Is it a belief that it is cheaper and quicker or a lack of understanding that other options should be explored?

## Case studies: options for mitigation

### Sedgeberrow: local resilience and partnership delivery

#### Background

Sedgeberrow is an historic linear village that has been expanded throughout the 20<sup>th</sup> century. The historic core of the village is situated on lower-lying land, that is adjacent to the River Isbourne and that extends south west along the gently rising elevation of Main Street. A significant number of late medieval, and post-medieval buildings, survive, and below ground remains reveal a settlement has existed here continuously since prehistory.

The Isbourne rises on Cleeve Common in Gloucestershire, drawing from a catchment of approximately 48 square miles. It flows north for 14 miles to its confluence with the River Avon at Evesham (source: Isbourne Catchment Group Prospectus, December 2014). Sedgeberrow lies towards the end of the catchment, below a heavily farmed arable landscape. The impermeable underlying clay and lack of natural attenuating features (e.g. woodland, wetlands) mean that the catchment is highly responsive to flood events.

Rapid fluvial flooding is a signature feature of the river, which responds quickly in high rainfall scenarios. The resultant rapid rise in storm water leaves very little time in which to act. The village has flooded many times during the 20<sup>th</sup> and 21<sup>st</sup> centuries, but the flood of July 2007 was severe. Gauges on the River Isbourne, rose by 4.6m in just 12 hours, from just 0.33m to an estimated level of 4.93m (Worcestershire County Council 2008). Several historic properties at the eastern end of the village were damaged, some severely, during the flood event, which necessitated emergency repairs, and in some cases, major or near total rebuilding of the worst affected properties.

#### Community response

The events of 2007 resulted in the formation of The Sedgeberrow Flood Group: a community-led network that can very quickly marshal local resources and share information with other organisations, should a future flooding event occur. Sedgeberrow is an exemplar case of a community-led resilience and knowledge network that has quickly developed a set of processes to limit the effects of rapid flooding.

The Sedgeberrow Flood Group has undertaken regular river and stream walks & assessments, monitoring and reporting issues. They also encourage reporting of incidents and issues by locals to the group, who then liaise with the appropriate authorities. They have undertaken surveys of historic environment features, such as culverts, but had not realised they were doing so. The objective was purely clearance of blockages; however in doing so were assessing historic structural form and condition.

The Isbourne Catchment Group was formed in 2014 to develop a mitigation strategy for the whole catchment. The Group's aim is to *minimise both the frequency and severity of flooding in the Isbourne catchment into the future, whilst also recognising the importance of land management, water quality and the wider environment.*

Initial work led to the development of a prospectus that set a timetable for gathering data and mapping to improve the environmental evidence base and establish priorities for action to mitigate future localised and cumulative flooding impacts along the Isbourne.

The Group has built a partnership of Agencies, Local Government, NGO, academic and community organisations to assist in all aspects of the Prospectus. There is, however, a lot of work to be done before significant benefits can be delivered on the ground.



The principal system of delivering land management-based improvements has been through Countryside Stewardship, which has been promoted by the Gloucestershire Farming and Wildlife Action Group (FWAG). Existing landscape features, such as, ditches, ponds, historic water management features and so on lend themselves for enhancement to deliver mitigation through capital and management funding. New features and enhancements, such as grass field margins or targeted woodland creation delivered through capital agreements can add further mitigation. The effects and benefits over time will be cumulative throughout the catchment.

The local, community-led approach being put into practice via the Isbourne Catchment Group is based on a practical approach that recognises the significance of managing agricultural land for run-off where the majority of flood water emanates. The Cotswolds is a mixed-farming upland landscape. Figures for the AONB show that the majority of the area is represented by arable (41.29%) and permanent or temporary grassland (43.79%). Woodland at 6.13% and set-aside at 4.47% are the next most common land use types with only 2.11% of the area mapped as rough grazing ([Cotswolds AONB](#)). This sets the Cotswolds apart from, for example, the uplands of South Western England where the proportion of rough grazing land is higher. Therefore, run-off from arable fields is likely to be a significant source of pluvial flow that ultimately becomes funnelled into the Isbourne.

Some key opportunities that can be delivered through Countryside Stewardship include:

- Protection and sensitive enhancement of historic water-management features and wetland areas to help attenuate pluvial flow.
- Restoration of historic ponds to contribute towards flood storage capture.

- Wildflower-rich grass margins for arable fields.

Natural Flood Management has emerged relatively recently, taking a landscape scale approach towards flood attenuation through a combination of techniques. The Scottish Environment Protection Agency (SEPA) published a comprehensive guide in December 2015 that covers a range of scenarios and provides a suite of methods to manage catchment-scale flooding.

([SEPA NFM Handbook](#))

The Stroud Rural Sustainable Drainage (RSuDS) project, led by Stroud District Council, is an ongoing initiative to manage flood risk at a catchment scale in the Stroud Valleys, where heavy flooding occurred in July 2007.

[Stroud RSuDS](#)

The Project began work on site in 2014 applying the principles of attenuation, infiltration, diversion and capture; all focused on the aim of slowing the flow of water into the main watercourses.

## Opportunities

A key benefit of the Natural Flood Management approach is its ability to deliver cost-effective solutions to localised flooding issues that will, in turn, contribute towards the whole catchment flood management plan. For example, in a woodland setting and with the cooperation of the landowner or land manager, the introduction of woody debris (trimmings from thinning) or very large woody debris (sections of tree trunk) to watercourses can immediately contribute towards the diversion of storm water, aiding infiltration, or equally slowing the flow. The cost of this type of work is negligible when carried out as part of routine woodland management and may even lead to a saving if material that would normally be taken off site can be utilised as woody debris.

The landscape context of the Isbourne catchment, its land use and associated settlements, lends itself to the adoption of a Natural Flood Management plan approach that will be an effective partner to the land management solutions implemented through Countryside Stewardship. An example of where this approach could be effectively implemented is within the historic parkland of Toddington Manor (in Gloucestershire, 5-6km south of Sedgeberrow). The existing weir just north of the manor already raises the water level and there is potential to divert more flood water into the parkland through minor improvements (*pers.comm.* Isbourne Catchment Group, following a catchment walk with the University of Gloucester in November 2016).

A project that has the potential to contribute to flood management along the Isbourne catchment, alongside other environmental considerations, is the ***Carrant Catchment Area Restoration Project***. This project is focused on the Carrant Brook and River Isbourne and is a collaborative 5 year project funded by Natural England and being led by the Farming and Wildlife Advisory Group South West. The project aims to improve natural habitats along the waterways, including the reduction of water and silt run-off, and soil erosion. Clearly there are opportunities here for incorporating the historic environment into the multi-disciplinary benefits that such projects offer.

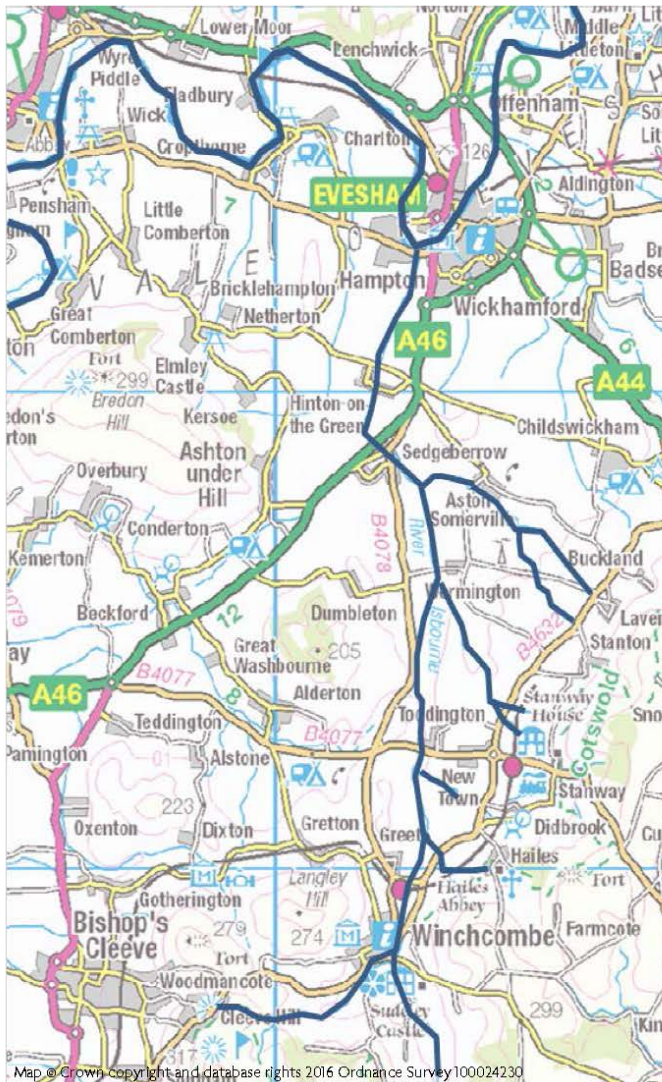
## Conclusions

While the long-term protection and management of the historic environment might come through large-scale, multi-disciplinary, catchment based approaches, local groups working across the county and beyond can incorporate a number of initiatives into their projects that will build resilience, whilst enhancing the historic environment or using it to deliver their other aims.

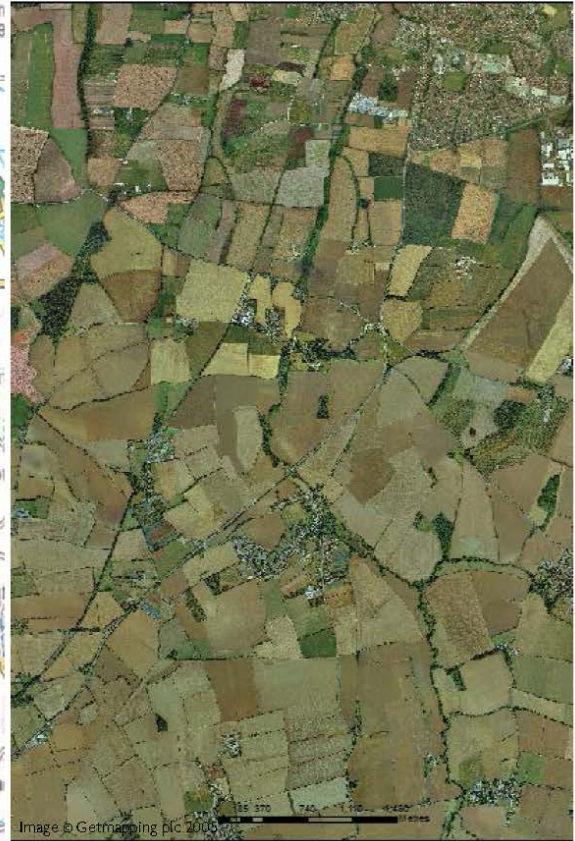
Sedgeberrow community ([SESAME flood group](#)) is exemplar of the potential of locally-led

resilience and coordination. They run a number of initiatives, which includes building flood resilience into the village [Sedgeberrow Flood Group](#). **There is potential for the group to record the existence and condition of historic environment features as they undertake projects, such as installing insulation in older properties or condition assessing the aftermath of flood events.** These features can contribute to a greater understanding of the historic village. Historic water management features could potentially be reused to attenuate flood water in the future.

Since WAAS carried out consultation with the flood group in 2015, they have recorded the locations and conditions of the historic culverts and these have been added to the HER. The problems of WAAS budget cuts and reduced staffing have meant that no further work has progressed in this area, but there is huge potential for further engagement and significant benefit.



Left: The catchment of the River Isbourne from its source on Cleeve Hill to where it joins the Avon at Evesham. Below: The arable landscape that characterises the lower catchment with Sedgeberrow village in the centre.



Below: There are opportunities for Natural Flood Management and the enhancement of historic water management features along the catchment of the River Isbourne, such as directly south of Sedgeberrow, where silted up former river channels and associated ponds lie under permanent pasture.



## Wribbenhall: a case for strategic catchment management

### Background

Wribbenhall is a distinctive historic settlement on the eastern bank of the River Severn opposite the 15<sup>th</sup> century planned riverside town of Bewdley. Both settlements have a long association with severe fluvial flooding events. The topography of Wribbenhall is low-lying and therefore particularly vulnerable to flood storage. Clearly, this presents a significant challenge.

### A catchment level response

Wribbenhall's location at the lower extent of the mid-Severn Valley is problematic because it is at a point where the river has become a major watercourse and is at the heart of a huge catchment. The local topography is still that of a valley, consequently flood waters are largely contained within the immediate environs of the river and there are few options to explore with regards to sacrificial land for flood storage. The size of the Severn catchment is a significant factor. Its source in Mid-Wales is located in an area of high average rainfall (source: [The MET Office](#)), which can result in flooding downstream when rainfall has been high over Wales regardless of that in England. When high rainfall also occurs in western and Midlands England then the effects combine to present a severe flood risk along much of the lower Severn.

Flooding from the Severn is a strategic problem and, therefore, a catchment-based approach to mitigation should be pursued alongside local targeted solutions, which alone cannot adequately offset regular flooding on the macro scale.

Coordinated flood risk management planning must also be approached from a strategic perspective, irrespective of Local Authority and Agency borders, and therefore landscape-led, in order to fully understand the capacity of the landscape to deliver solutions.

### Catchment-based opportunities

Once again there is a role for Natural Flood Management, which could, over the long-term, begin to attenuate the flow of water into the catchment. In the case of Wribbenhall, the more local effects of high water flow from Dowles Brook (located in Wyre Forest) offer a prime opportunity. The Dowles Brook catchment makes up about 1% of the catchment of the Severn at Bewdley, so any scheme on the Brook must be seen as complementary and part of a wide ranging package of measures. Natural Flood Management on the Dowles Brook alone will not prevent flooding in Wribbenhall.

The Dowles Valley transects Wyre Forest to its confluence with the Severn approximately 1 kilometre upstream of Wribbenhall. The Dowles is associated with very few properties and so has not been considered as a flood risk watercourse in that context. However, Dowles Brook responds very quickly to rainfall with a catchment that includes Wyre Forest and areas of farmland in the forest's hinterland. It has emerged that Dowles is responsible for a *second spike* of flood water that enters the Severn and presents a significant impact to Bewdley and Wribbenhall (B, Smith, Environment Agency pers.comm). The Dowles catchment is currently the subject of a developing bid for Natural Flood Management grant funding. It is hoped, if successful, to create a network of features that will attenuate the flow of water into the brook and thereby reduce the risk to Wribbenhall and Bewdley.

This, of course, would be a first step in addressing the strategic need of the Severn catchment and basin. It highlights the importance of a coordinated flood management plan for the entire river system so that other candidate landscapes can be identified and assessed for their potential contribution towards cumulative flood mitigation. The range of techniques promoted through Natural Flood Management also offers more adaptive

solutions, which through informed design can respond to the landscape context and inherent sensitivities. This is in contrast to the more uncompromising approach proposed by *Rewilding*.

The Environment Agency states that Natural Flood Management alone cannot prevent the severity of flooding experienced in 2007. It can, however, reduce the risk posed by more frequent, seasonal flooding (B. Smith, pers comm.) therefore, demonstrating an outcome whereby a degree of increased resilience can be achieved. There is currently no model for understanding how far Natural Flood Management will mitigate the effects of flooding across the Severn as a whole, let alone in one specific location. There are, perhaps, too many variables in the circumstances that lead to flooding to predict such outcomes. It does, however, offer a strategic framework within which to assess other methods of mitigation at a local level.

A recent report by the Green Alliance (Wheeler *et al.* 2016) states that:

- Nearly four times as much money is spent on land management that ignores or increases flood risk than on land management that helps to prevent flooding.
- Twice as much is spent on dealing with the after effects of a flood than is spent on hard flood defences.

The report also highlights the problem that national funding tends to require flood schemes to achieve resilience against significant events (1 in 20 or 1 in 100), whereas individual Natural Flood Management schemes tend to concentrate on reducing more frequent, lower peaks. It must be considered however, that the cumulative impact of a number of small schemes, such as the examples detailed in the report, could result in a significant change lower down in the catchment of large rivers. The suggested scheme within the Dowles Brook

could be repeated along water courses draining into the Upper Severn Catchment, not only reducing local peaks, but slowing the flow along the entire catchment.

## Local impacts from a strategic problem

The frequency of flood events in Bewdley and Wribbenhall led to a major flood alleviation scheme on the western river bank, completed in 2005, to provide a permanent, but demountable flood barrier. This can be quickly erected in advance of a flood surge on the Severn and provides protection against flood events as severe as that seen in 2007.

Wribbenhall has no equivalent defensive structure and has, in the recent past, relied on a temporary flood barrier erected by the Environment Agency to protect properties in its historic core. Following the 2008 Pitt Review (Pitt, 2007), a 2014 cost-benefit analysis of the Bewdley/Wribbenhall defences (Environment Agency, 2014) concluded that continuation with the temporary barrier system on the east bank (i.e. the Wribbenhall side) was not sustainable. Further, the barriers were not deemed to be sufficiently effective against the most major of flood events, such as that of November and December 2000, providing residents with a false sense of security. Property Level Resilience (PLR) (where bespoke measures are tailored to individual properties, rather than collective resilience/resistance through a singular scheme) is being advocated as the only viable technical, environmental, and financial option for the future. The Environment Agency is seeing budget cuts, alongside an increase in significant flood events and cannot continue to fund the temporary barrier erection because it is not seen as a sustainable solution.

The need for Property Level Resilience measures to be sensitive to the historic character of Wribbenhall has been highlighted by Historic England, the local authority and the National Flood Forum. Measures that do not take

account of archaeological and historic sensitivities and the qualities of the historic fabric of the buildings could have an adverse impact on the integrity, character and future sustainability of significant heritage assets. Historic England and the local authority are working with the Environment Agency to find solutions that accommodate these concerns.

The implication of allowing the 'at risk' area of Wribbenhall to flood poses a specific problem to historic buildings. Making individual buildings more resistant to flooding is possible; however their location means that the buildings will still flood in extreme events. For historic buildings in particular, the challenges are also likely to be significant. It may not be technically harder to retrofit traditionally constructed properties, but there are significant challenges around damaging or losing historic fabric when adding flood resistance measures.

A number of timber-framed late medieval and early post-medieval buildings lie on the riverfront, two are Grade II\* Listed and most of the others are Grade II. The Environment Agency is leading a scheme to provide a Property Level Resilience (PLR) solution for these buildings. Under the proposed scheme, contractors have been brought in by Severn Trent Water and the EA, to add resistance features. Replica waterproof doors will replace existing doors on most of the properties. This will result in the removal of historic fabric from these sensitive properties, which must be carefully managed. Even with the addition of flood doors, there are significant and complex issues involved in minimising water ingress into these buildings, and effective solutions are challenging to find for all the buildings, not only the historic buildings.

It is not just the loss or damage to fabric when resistance measures are installed that is of concern, but the potential long term impacts of

these and other measures. Water-proof sealants, for example, are often recommended to be applied to the exterior of buildings. These can trap moisture and cause significant problems after flood events. This can occur with any age of building, but timber-framed structures are designed to breath and are particularly susceptible to damage caused by trapped moisture.

Where historic fabric is lost or irreversibly altered, the rationale needs to be robust. Changes must be justifiable and the benefits must outweigh the harm. Historic England and the Local Authority are working closely with the EA to ensure that any measures put onto listed properties: do what they are meant to do; don't have unexpected negative consequences for the long-term preservation of the building; and are designed in such a way as to minimise their impacts (aesthetic and historic).

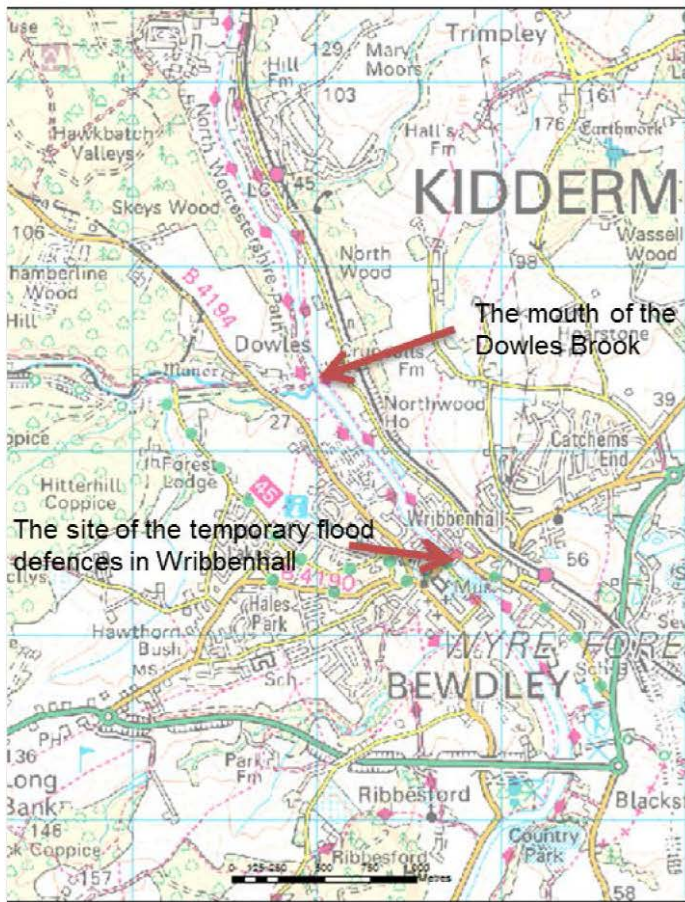
The wider challenge is making sure that properties are considered case by case: what suits one (building type + flood risk type) may not be at all suitable for another. This is of course true for ANY building, not just historic buildings. HE and the Local Authority have the technical buildings expertise to help the EA develop their guidelines for PLR and other measures to circumvent the very real risk of unintended consequences, not just in Wribbenhall, but nationally as these schemes are rolled out.

The use of the temporary barriers has been extended to 2020 while the solutions are explored in detail and Bewdley Town Council has established a group of Community Flood Volunteers to assist the EA, and ensure that information on decisions, consultations and timescales are effectively communicated.

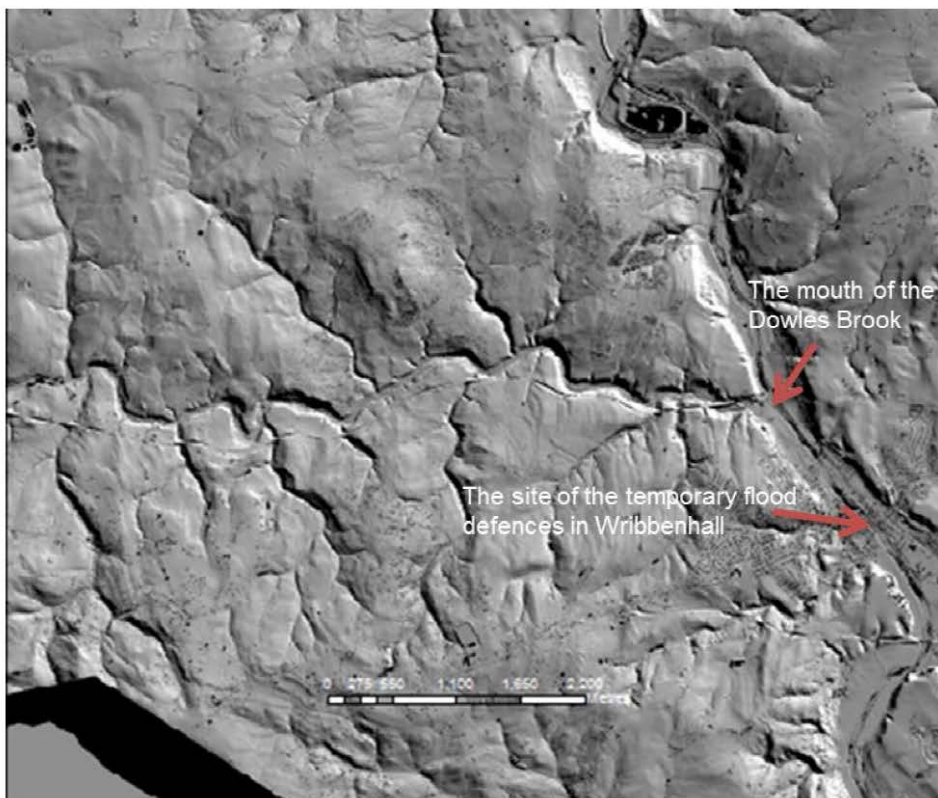


*Wribbenhall , Above: in 1937 (© unknown) and Below: showing some of the historic buildings impacted when the river floods. The corner of the building in the picture above is the white building in the centre of the image below with the gable facing the river (© WAAS).*





Left: Map showing the location of the Wribbenhall defences in relation to the Dowles Brook (@Crown copyright and database rights 2017 100024230). Below: the Wribbenhall temporary flood defences deployed in the summer of 2012, with the listed buildings it protects highlighted in red (@Environment Agency)



Left: Lidar imagery of the Dowles Brook showing the majority of the extent of the catchment and the steep slopes that result in the rapid flooding of this highly responsive water course (@Forestry Commission, Unit for Landscape Modelling and Forest Research).



## Discussion

The surveys, discussions with local communities and examples of existing projects, show that there is a lot that can be achieved in terms of empowering communities to build resilience for the future, and a lot that the historic environment profession can do to support this.

At an individual building level there are problems with a lack of understanding of traditional construction methods by many of the parties pushing for property-level interventions: that is, government agencies, insurers, and contractors. The historic environment profession needs to disseminate our knowledge and advice in better ways because the evidence shows that the owners and custodians of these properties are keen to receive it. They want the best long term solutions for their homes and businesses, and certainly do not want to find themselves with expensive repair bills caused by damage from inappropriate measures. Empowering communities and individuals to deal effectively with the agencies implementing these measures, and providing them with sources of knowledge and advice about the most appropriate responses is a key method of minimising the number of negative and damaging solutions.

The case study of Wribbenhall highlights the issues of designing resistance into traditional buildings. As the buildings here are mostly Grade II or II\* Listed, a lot of discussion and thought is going into the design of any resistance measures. The challenge of making timber-framed buildings resistant to future flood events is being fully explored, and care is being given to the materials that will be used. There will be no unnecessary removal of historic fabric, and any new materials will need to be sensitive. However, most historic buildings are unlisted and this level of care is not taken.

Even where buildings are Listed, there is evidence that a lot of insensitive adaptations

have been made, often with the false belief that there is no alternative. Examples given by the survey respondents demonstrate the frequent installation of measures causing real harm to traditional, permeable building materials, such as the application of waterproof sealants. Often these measures actually offer little or no benefit in a flood, but they make it difficult to dry the buildings afterwards, and not infrequently they will cause severe damage. Other PLR measures, such as non-return valves and air-brick covers, should be promoted. Their benefits are clear, and impacts minimal to non-existent.

Catchment-scale projects offer an opportunity to reduce flood risk and mitigate flooding downstream using natural processes, many of which are quick to implement and cost effective. Countryside Stewardship, one of the principle systems of delivering land management opportunities, including reducing flood risk, is an effective mechanism for change; The Carrant Catchment Restoration Project, for example, has received support from Countryside Stewardship's Facilitation Fund. This project is being led by the Farming and Wildlife Advisory Group (FWAG) South West and there is little doubt that FWAG are acting as enablers; building social capital amongst the farming community, the local community and partners.

The absence of FWAG – providing trusted, independent environmental advice - in the West Midlands region may impact on opportunities to connect farming communities to catchment scale initiatives beyond South Worcestershire.

It is important to treat each scheme individually, as there are sensitivities to address, for example, restoration of watermeadows is no longer an option in Countryside Stewardship, as the Environment Agency is worried about them becoming fish traps following a flood.

The challenge within local authorities for heritage professionals, e.g. Conservation Officers and Archaeologists, is how to address these issues in a climate of diminishing

resources. There is, at present, no capacity to run training sessions or support communities in the manner that the consultation indicates is necessary. The Historic England funding has allowed Worcestershire to produce bespoke leaflets, engage with a range of partners and build new relationships. This project now requires promotion, and those who engage will need support and guidance. Finding the staff time to achieve this will be a priority, but it will need to be carefully managed to make the best of extremely limited resources.

Volunteer flood wardens across Worcestershire receive bespoke training to enable them to understand their role and stay safe. There is an opportunity to provide training to flood wardens and to other communities directly involved in flood management on both a county wide and in a very local context.

Neighbourhood Development Plans (NDPs) can empower local communities to set planning policies for their local area, including planning for flood mitigation and resilience. NDPs offer a direct opportunity to engage with communities to promote the potential under-pinning significance of the historic environment to mitigation and resilience measures and to highlight the potential impacts to heritage assets, from flood events. Early consultation with the heritage sector, including Historic England and Historic Environment Records, is essential, in order for historic environment advice to be fully integrated within developing plans. (Partington, 2014).

The Strategic and Environmental Planning, Flood Risk Management and Archive and Archaeology Advisory Teams within Worcestershire County Council have recently developed a commercial package of support aimed at community planning groups, although it can support any place-based assessment where a better understanding of cross-cutting environmental themes is required.

The support package is designed to be flexible and cost-effective for Neighbourhood Plan groups, given the complexity and often significant costs faced when producing a Neighbourhood Development Plan. At its core, it will help to identify where and how sustainable development can most effectively protect, restore and enhance biodiversity, protect and enhance the setting of historic environment assets and protect against the impact of flooding. Neighbourhood Development Plans need to be backed by a solid evidence base and policies that are relevant to the locality. Neighbourhood Development Plans not supported by robust evidence could be challenged at the examination stage, so it is essential that both the evidence base and policies are fit for purpose.

Taking an integrated approach to local landscape and townscape assessment not only supports the aims of community planning, but can also deliver effective flood mitigation whereby a proportion of solutions are delivered by developers as part of both on-site and off-site Green Infrastructure mitigation. This allied with betterment delivered through Countryside Stewardship and other locally delivered solutions will contribute towards a cumulative and measurable improvement in local flood resilience.

## Recommendations

1. Learn lessons from and promote landscape scale flood management projects – working with natural processes - such as the Stroud Rural SuDs project.

*'To create a river catchment where water management is fully integrated into land management practices. Where public bodies, private companies and local communities work together to manage water within the landscape, creating valuable habitat for wildlife and people, and limiting flood risk downstream.'*

2. More effective partnership working with Natural England, the Environment Agency and the Rivers Trusts to deliver landscape scale flood resilience projects.
3. Promote the concept of reusing historic water management features, with the potential to contribute towards local flood mitigation as part of Countryside Stewardship land management agreements.
4. Better liaison with organisations involved in river restoration.
5. Water management structures are often poorly recorded and understood. Pursue opportunities to better understand these structures, particularly where this can be achieved as part of a community-led project.
6. Where possible use of fish passes that are in keeping with historic structures and landscapes.
7. Weirs have been removed elsewhere in the country and although recorded there has been no assessment of their significance or the impacts on the wider historic environment. Ensure that any weir removal projects consider the impacts to the historic environment fully.
8. Scrutinise development in vulnerable areas along river corridors such as flood plains and wetlands.
9. Promote the use of water penetrating radar for underwater prospecting.
10. Implement sustainable drainage systems SuDS to attenuate, diffuse, and infiltrate floodwater.
11. Ensure communication about the flood resilience champions – to facilitate the relationship between the Lead Local Flood Authority, the Environment Agency and communities.
12. Tailor bespoke packages of advice and guidance for local flood action groups and Volunteer Flood wardens. Volunteer flood wardens across three counties receive bespoke training to enable them to understand their role and stay safe. Work with these groups to disseminate messages to the wider community.
13. Tailor bespoke packages of advice and guidance for 'hard to reach' groups. Investigate with specialists in Historic England, local authorities and other organisations how this advice can be effectively disseminated.
14. Write a combined communication plan for all public and professional engagement with the historic environment, to ensure the best use of increasingly reduced local authority resources.

## References

Environment Agency. 2014. Future flood risk management at Beales Corner / Wribbenhall, Bewdley, Worcestershire. [Bewdley Town Council](#) Accessed December 2016

Forbes, K, Ball H, K and F McLay. 2015. Natural Flood Management Handbook. Scottish Environment Protection Agency (SEPA) [SEPA NFM Handbook](#)

Isbourne Catchment Group. 2014. Prospectus [Isbourne Catchment Group](#)

Met Office [The MET Office](#)

Pitt, M. 2008. Learning lessons from the 2007 floods. The Pitt Review [The Pitt Review Online](#)

Wheeler, N, Francis, A and George, A. 2016. Smarter Flood Risk Management in England. Green Alliance. [Green Alliance](#)

Worcestershire County Council 2008. *Planning for Climate Change in Worcestershire*. [WCC Planning for Climate Change](#)

## Survey Monkey questionnaire

In 2014/15 Historic England commissioned Worcestershire Archive and Archaeology Service to investigate the impact of flooding and flood-mitigation on the county's distinctive historic environment and landscape character. The project was undertaken together with Dr Andy Howard of *Landscape Research & Management* and a number of community and organisational partners. [Worcestershire Flooding and the Historic Environment](#)

Part of the project involved consultation with property and land owners in Worcestershire affected by flooding. Historic buildings often need different treatment to modern structures, and ill-judged repairs can have a damaging effect on the fabric, appearance and value of an old building. It was evident from our consultation that the support and guidance available to owners of historic buildings has not been widely shared by the heritage sector, both for repair and restoration following flood events and for building resilience to future events. Anecdotally, it was also suggested that those within professions directly engaged with mitigation, restoration or reconstruction of flood damaged historic buildings and structures would also benefit from a greater awareness of the options, advice and support available.

Following on from that pioneering research, we want to find out how these issues affect residents and contractors in Worcestershire, and what we can do to alleviate problems. To help us do this, we would be very grateful if you could take the time to fill in a short questionnaire. This should take between 15 minutes and half an hour to complete, depending on your experiences with flooding.

At the end of the questionnaire, you have the chance to leave your contact details if you would be happy for our researchers to contact you to talk in detail about your experiences. If you leave us your contact information, it will not be shared with any third parties or used for any other purposes, and at the end of the project all responses will be anonymised and all names deleted from the project archive.

Many thanks for your help!

***First of all, we need to find out something about you:***

- 1 Are you a:
  - Specialist damage management contractor
  - Insurance assessor, loss adjustor or otherwise involved in insurance claims
  - General building contractor who has repaired historic structures following flood damage and/or installed flood protection (flood doors, pumps etc)
  - An owner of an historic building who has dealt directly with contractors and insurance claim(s) for flood repair/restoration within the last 10 years
  - Small business owner who has dealt directly with contractors and insurance claim(s) for flood repair/restoration within the last 10 years
  - Surveyor/architect who has been involved in flood repairs/resilience
  - Other (please specify)

- 2 Do you feel confident that you understand the legal framework regarding listed and scheduled structures, when consent might be required and where to go for advice and support?
  - Very confident
  - Somewhat confident
  - Not confident
  - Not at all
  
- 3 Do you feel confident that you either know the best options for the repair of historic buildings after flood events, or that you know how to find specialist contractors and have confidence in their ability?
  - Yes
  - No

*Now we would like to understand what level of familiarity you have with the existing guidance:*

- 4 Are you aware of the Historic England guidance on flooding and historic buildings [Historic England Advice](#)?
  - Aware of the guidance, and have used it
  - Aware of the guidance but have not used it
  - Not aware of the guidance
  
- 5 If you have used it, did you find it helpful?
  - Very helpful
  - Somewhat helpful
  - Not very helpful
  - Not at all helpful
  
- 6 Are you aware of other useful support documents and resources?

*Please specify*

*We'd now like to ask you some detailed questions about your experiences:*

- 7 Have you come across instances of post-flood repair of an unlisted historic building, where you feel the owners, insurance companies/loss adjustors, or the contractors were insisted on a solution that you felt wasn't appropriate?
- Yes (optional details below)
  - No

- 8 Have you encountered problems arising from a poor response to flood damage (tick all that apply)
- Moisture problems resulting from the application of non-porous paints or renders on internal or external surfaces (examples include damp, mould growth, timber decay, spalling of masonry or plaster).
  - Replacement of damaged original fixtures and fittings that could have been restored, but weren't because it was deemed quicker/cheaper/less onerous to replace them
  - Installation of inappropriate or unsympathetic flood resilience measures (e.g. uPVC flood doors)
  - Measures that later proved to be damaging or ineffective
  - Other (please specify and add further details for the options above if appropriate)

- 9 From what information, advice and/or training do you feel you/your sector would benefit from?
- Practical courses in techniques for repair/maintenance of historic buildings, e.g. lime mortaring
  - A heritage champion or community volunteer to provide local advice
  - Advice through workshops/talks by heritage specialists on how to care for historic buildings and appropriate measures to increasing the resilience of historic buildings to flood events
  - Social media with local and national information, forums and live data
  - Other (please give details)



- 10 Would you be willing to take part in the next stage of our project, where we will be talking directly to a number of respondents about their experiences? If yes, please fill in below your preferred contact details. These will be used only for this purpose: your name will not be published anywhere in the report, and your information will be deleted from the archive immediately the project is finished.

## Follow up Questionnaire:

**Question 1: How can we raise the profile of heritage with professionals and organisations - surveyors, insurers, loss adjusters, contractors, damp proofing specialists, drying companies - involved in either flood mitigation measures or cleaning, drying and repair works following a flooding event?**

- In most cases all involved do not understand that a period property needs to be treated differently than a modern constructed property.
- Cement containing materials should not be used in a period property
- The use of BS7913: 2013 should be referred to on each job
- The word heritage should be limited and words such as period, traditional, solid should be used, in most cases people refer to heritage properties as 'Listed'.
- Drying companies should not be instructed first it should be the surveyor, they have the knowledge and then a plan should be implemented. This would save a lot of money and building materials.
- In most cases the original plaster (lime) should not be taken off in the first place given its properties the walls can breathe and dry out
- Damp Proofing specialists should not be used or recommended by any competent surveyor etc
- 'Approved' insurance contractors are not competent to complete the works
- Training courses should be provided with all of the parties involved in an insurance claim and this should be taken by a heritage surveyor who has knowledge of BS7913:2013
- All parties should have an understanding of the benefits of traditional materials and how modern materials do cause issues within a period property.
- Personally I would recommend that the policyholders employ their own surveyor who has knowledge in period properties. It is common for the fees to be paid by the insurance company under the policy as they do have the option to use their own surveyor. Also on a like for like policy if lime plaster is removed then lime plaster should be put back but in most cases cement is used which in time will cause thermal issues and defects such as damp.
- Training/CPD sessions for local flood groups, volunteer flood wardens and other local groups
- In my experience I feel that insurance surveyors rush the job due to their work case load, they heavily rely on the drying companies, the contractors and the schedule of rates the insurance company approves; when comparing this to a detailed specification it is extremely limited therefore any materials can be used by the contractor
- Surveyors knowledge is limited.
- I feel that adjusters should have CPD's on period properties and the benefits of appointing a competent surveyor who has a good understanding of the type of property.
- Adjusters should promote the appointment of a competent surveyor rather than appointing their in-house surveyor
- As insurance companies appoint the drying company prior to the adjuster etc these need to be targeted as drying companies rip off insurance companies in most circumstances. If a competent surveyor was to be appointed at an early stage then the building materials could be understood and a suitable plan could be implemented.

**Question 2: How do we encourage early engagement with and the uptake of advice from accredited specialists and guidance? In what practical ways could we better promote the use of existing national and local heritage guidance? (e.g. CPD training, national forums, chartered institutes, use of social media, external websites?)**

- If a flood was to occur a data sheet would be beneficial
- Influence from chartered institutes would be beneficial to increase awareness to surveyors whom do not currently understand period properties.
- CPD training throughout (all parties involved) to give a better understanding and inform of the correct ways to rectify flood damaged heritage properties. CPD's should be held by specialist surveyors / companies whom would carry out the correct restoration works.
- Insurance companies need to use the correct guidance (BS7913:2013 / BRE guidance notes etc.) not relying on drying companies or incorrect guidance given by others

- A MASSIVE influence would be to visit the insurance companies / loss adjustors / policyholders and help them understand period properties as essentially these are the people who make the decisions and own the properties. Currently these people will only see the additional costs and time implications when using traditional materials.
- Social media would definitely have an influence in the modern day. I would note that social media should not be dealt with in a patronising way, messages / articles on social media should be educational and focused on increasing awareness throughout the industry. Links to online CPD's etc. on social media from these messages / articles would be useful for others to access.
- Guides for policy holders would be good; this would educate the policy holder about the construction of their property and allow them to appoint the correct persons to survey / carry out restoration works. The policy holders will want their property to be reinstated properly if they had the understanding of the effects of reinstating a traditional building with modern materials.

**Question 3: The roles and responsibilities of different heritage agencies are often difficult to disentangle and communication ineffective. Up-to-date information and advice is often overwhelming or difficult to find online. Who do you think should facilitate – i.e. provide a hub for- heritage information?**

- Simplify information first of all.
- Provide clear and concise guidance notes.
- Guidance notes should agree with each other and not contradict as currently there are views which do contradict each other, therefore causing uncertainty.
- Information provided by key websites i.e. BRE / RICS etc.
- Heritage information on insurance websites for policy holders to view.
- Essentially this information needs to infiltrate from the top down, e.g. RICS to surveyors / insurance companies to their surveyors and contractors.

**Question 4: Do you have any examples of a best practice, multi-organisational response, to flood mitigation works or following a flood event?**

- I have various examples of claims which have gone wrong and defects have occurred following the reinstatement of a property following an insured peril.
- Also I have recently completed a claim following a flood the policyholder trusted me after a 2 hours of explaining why I had a different specification to her neighbouring properties
- In my opinion the flood mitigation measures do not work on period properties and they will cause problems. As these are heavily advertised during a flood, people get drawn into purchasing these items. i.e. waterproofing stone/brick walls – the amount of water that floods doesn't come through the walls, it comes through the doorways / holes / drains etc.

**Question 5: Would you like to see more training events made available for professionals and involved in either flood mitigation measures or cleaning, drying and repair works following a flooding event? If so what should they focus on?**

- There are people out there willing to educate others on this matter however they are ignored by insurance companies and their surveyors / contractors; likely to be due to additional cost and time which they are not given by the insurance companies.
- Due to climate change flooding is likely to become more frequent therefore it is essential that there is a clear understanding of correct methods of prevention and reinstatement. If there is not a good understanding then we will simply ruin our heritage built environment.
- Focus on prevention first of all. Secondly, focus on construction of heritage properties and the materials used and stress the importance of retaining these materials or replacing with the same, not modern materials such as cement or gypsum.

**Question 6: Are there any other questions that you feel we should be asking to support the heritage response to flooding?**

- As a part of the study producing draft guides etc. would be useful which may then be circulated to persons questioned for feedback.
- Questioning insurance companies I think is crucial if possible to obtain their understanding.
- Questions regarding cost and time implications of using traditional materials would be useful. Is this the reason some surveyors / contractors opt not to reinstate heritage properties the correct way and instead replace with modern materials as they are quicker to install and cheaper?