



Flood Risk Management and the Historic Environment

An analysis of historic environmental practices in
respect of planning for, and responding to flooding



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This document has been created as part of an Historic England funded project undertaken by Worcestershire Archive and Archaeology Service (WAAS) in partnership with Landscape Research & Management.

The project has aimed to understand the threats to Worcestershire's historic environment through the impact directly from flood events and indirectly from measures of mitigation, adaptation, and response; provide guidance to make heritage more resilient to these threats; develop effective counter-disaster responses for heritage; inform the responses to these threats by other sectors and organisations; and to critically assess the roles of heritage specialists within government authorities and agencies in respect of flooding and flood risk.

A series of articles have been produced which, while undertaken in respect of recent practices within the county of Worcestershire, provide recommendations that aim to inform a broader scope of approaches to flood risk management across the historic environment sector. The articles: critically assess the recent flood alleviation schemes in respect of their historic environmental practices and impact; outline a mechanism devised by WAAS through which to better map historic environmental features for use within disaster planning and response; and a study of the impact of recent floods within the county and issues of community resilience, awareness, and capacity in respect of heritage matters. Detailed abstracts are provided overleaf.

These articles are one component of a suite of documents produced as a result of the project. Other resources include:

- A bespoke academic paper which provides a detailed analysis and overview of the challenges facing the heritage sector in response to changing catchment hydrology, climate change and current mitigation practices, in respect of national and pan-European frameworks. This is achieved through assessment of, and reference to literature published in a range of heritage and policy focussed journals, books and monographs.
- A series of guidance documents aimed at non-heritage professionals and members of the public engaged with managing flood risk and responding to flood events across the county. These provide an overview of good practice in respect of historic environment, alongside details on key resources and documentations that is available
- A full project report.

All of these products and further information on the project can be located on the project website – www.worcestershire.gov.uk/archaeology/flooding, or by contacting the Worcestershire Historic Environment Record and Advisory Service on archaeology@worcestershire.gov.uk.

Flood Alleviation Schemes and the Historic Environment - Page 3

Lessons in good practice for the design, planning and implementation of flood risk management works in respect of archaeological and historic environmental assets

This retrospective study is targeted towards planners, consultants and engineers involved in the development and design of flood alleviation schemes.

The study focusses on the potential impacts that alleviation schemes can have on historic environmental assets and considers good practice in mitigating those impacts. Key lessons in good practice are outlined to inform future engagement between professional stakeholders. Recent flood defence schemes at Kempsey, Upton-upon-Severn, and Bewdley are critically assessed to: identify areas of good practice in respect of historic environment; consider issues that arose in respect of management and mitigation of archaeological impact to and from the scheme; and outline how the design and implementation strategies of these schemes could have been improved with hindsight.

Mapping the Historic Environment for Consideration within Flooding and Disaster Planning - Page 20

A geospatial methodology for curators of historic environmental data to facilitate engagement with non-heritage stakeholders

This technical paper is aimed those who curate historic environmental datasets for flood prone localities, and those who seek to utilise this information to inform strategic planning for environmental disasters.

This paper outlines a mechanism, developed and delivered as part of this project, through which historic environment features which are either at risk from flooding (e.g. historic buildings within the flood zone), or remain influential to local hydrology (e.g. industrial water-management systems) can be highlighted to external parties. The text outlines the justification and technical framework for this approach in the hope it can be replicated for the betterment of flood-affected heritage beyond Worcestershire.

Assessing the Past and Potential Impact of Flood Events on the Historic Environment - Page 33

Critical analysis of historic environmental practices to support at risk communities and enhance their resilience to flooding

This report is aimed at historic environment curators of governmental and statutory organisations, and community advocacy groups working to build resilience to flooding with their respective localities.

This report details a study that has aimed to quantify the extent and form of impacts on communities occupying historic settlements at risk from flooding, alongside examining means of engagement (or lack thereof) with the heritage management and historic environmental sector before, during, and after major flood events. Various mechanisms of consultation have been utilised to examine concerns including: levels of engagement and awareness of historic environmental guidance and expertise; the extent to which change to the historic environment is being adequately reported and recorded; and how heritage practitioners are perceived by at-risk communities. The results are used to highlight the key issues pertaining to the historic environment sector's response to flooding and flood-risk; which in turn informs a list of recommendations as to how historic environmental practitioners can support and improve resilience within at risk communities.

Flood Alleviation Schemes and the Historic Environment

Lessons in good practice for the design, planning and implementation of flood risk management works in respect of archaeological and historic environmental assets

Summary

This document is targeted towards planners, consultants and engineers involved in the development and design of flood alleviation schemes. It focusses on potential impacts that such schemes can have on historic environment assets and considers good practice in mitigating those impacts.

Recent flood defence schemes at Kempsey, Upton-upon-Severn, and Bewdley have been critically assessed to: identify areas of good practice in respect of historic environment; consider issues that arose in respect of management and mitigation of archaeological impact to and from the scheme; and outline how the design and implementation strategies of these schemes could have been improved with hindsight.

*A **summary** of the key lessons for good practice is provided below, outlined in more detail within the final section of this study:*

- 1. The key to achieving good practice in respect of the historic environment lies in early consultation with key stakeholders.*
- 2. Engagement with the Historic Environment is a good way of showing that constructors and the agencies involved are taking on board the long term importance of these areas.*
- 3. There is no 'one size fits all' approach.*
- 4. It should be kept in mind that circumstances may change over time and therefore any scheme should assess where risks lie in respect of change.*
- 5. It is important to follow a process that will allow informed decisions to be made throughout the project, enabling archaeological fieldwork stages to be designed, programmed and implemented in good time within the development schedule.*
- 6. The planning and design of any archaeological fieldwork should be based around a well-researched and thorough desk-based assessment (DBA).*
- 7. The aim throughout should be to protect historic environment assets that might be affected wherever possible through sensitive design.*
- 8. Approaches taken should minimise the risk of unexpected discoveries being made once construction is underway.*
- 9. The early establishment of good lines of communication and understanding between all parties has benefits which will last throughout the project.*
- 10. The results of the archaeological work can have unexpected and lasting positive benefits for the local community.*

Introduction

Many of our historic towns and villages are built alongside our rivers and streams. Those along the Rivers Severn, Avon and Teme in Worcestershire, like many others across the country, have been badly affected by flooding for centuries and in recent years the impact of this on businesses, householders and the local economy has been especially severe. As a result, flood alleviation schemes devised to reduce the risks of flooding have become increasingly common.

These historic towns are economically important as tourist hubs, whilst the surrounding villages and countryside also provide important visitor attractions in their own right. As a result, any proposed flood alleviation scheme requires careful consideration and sensitive design in order to minimise the potential impact on the historic character of these areas. Schemes also need to ensure that they provide appropriate mitigation measures to address potential damage to important below ground archaeological remains liable to be present. These may typically include former bridges, quaysides and remains associated with the development of medieval and post-medieval river frontages. In addition, earlier Roman and prehistoric activity is often present in such floodplain and terrace environments, along with important palaeoenvironmental remains that may also be affected. Alongside ensuring that the impact on such historic assets is minimised, it is essential to ensure that effective and appropriate flood alleviation schemes can be constructed with the minimum of delay to most effectively manage the risks faced by the worst affected communities.

The Environment Agency employs a small team of in house heritage advisors. As part of the Environmental Impact Assessment process this team review the extensive programme of flood risk management projects and ensure that early engagement takes place with stakeholders and

that heritage risk is appropriately assessed and managed during the life a project. It is often the case, as with the projects described in this document that a significant amount of pre-planning consultation has been co-ordinated by this team, ensuring that unsympathetic options are avoided and also that appropriate resources and time have been allowed to manage any heritage impacts within a scheme.

Three recently undertaken flood defence schemes at Kempsey, Upton-upon-Severn and Bewdley are used as case studies to provide examples of contrasting approaches, construction techniques and impacts. Lessons learned are considered and used to emphasise good practice, as well as areas where improvements in the design and implementation of these schemes could have been made and further benefitted the historic environment as well as the efficient delivery of the schemes.

These case studies demonstrate that good practice in respect of historic environment assets facilitates the smooth and efficient construction of flood alleviation schemes, thereby helping to reduce risks to those communities affected by flooding as well as preserving and protecting our heritage.

Kempsey

Background

The historic village of Kempsey is situated 5.5km south of Worcester on a gravel terrace that overlooks the contemporary floodplain to the north-east of a large bend of the River Severn.

The village has regularly been affected by flooding over a long period by the Severn and its tributary the Hatfield Brook. Up until the construction of the flood alleviation works, homes in Kempsey had flooded 23 times in the previous 30 years. In the worst documented instance, in July 2007, more than 150 properties – almost a tenth of the village – suffered some degree of flooding. The main A38, which runs

through the village, was also closed for three days causing considerable disruption to businesses and communities served by this important trunk road. Apart from the damage and disruption caused by the flooding, contamination caused by flooding of the village sewer works also presented a more widespread public health hazard.

The Scheme

Working with a local community flood action group (Kempsey FLAG), the Environment Agency designed a flood alleviation scheme that, since its construction in 2012, has reduced the risk of

identified as being likely to affect archaeological remains in this historic settlement. As a result a programme of archaeological work was undertaken both prior to, and alongside, construction works. This work followed a staged process, with each stage informing the next. This process commenced in 1998, when an archaeological desk-based assessment was undertaken as part of the initial assessment of the viability of a flood alleviation scheme for the village (Appleton-Fox 1998). The assessment recognised that there was a strong potential for prehistoric and later remains to survive along the proposed route of the flood alleviation scheme. In particular the area to the south and

Figure 1: The completed Kempsey Flood Alleviation Scheme in operation in February 2014



flooding for some 70 properties within the village as well as the main road.

The Kempsey Flood Risk Management Scheme comprises a 180m long flood protection embankment and a system designed to pump rising flood waters from the Hatfield Brook into the River Severn. The scheme was substantially completed in September 2012 and, apart from a problem in November 2012 when a pump failed to operate correctly, has successfully reduced flooding of the village including during the very high flood levels along the Severn in January 2014.

The approach to the historic environment

Due to the involvement of an historic environment advisor from the Environment Agency from the outset of this project, the construction of these flood defences was



west of St Mary's Church was singled out, as it was the site of a late Saxon minster church and Bishop's Palace.

Some years later watching briefs were undertaken during the excavation of geotechnical test pits (Lee 2007; Lee 2011) and, in 2012, five 30m long and 1.60m wide evaluation trenches were excavated to test for remains along the proposed route of an access road and the pumping station. These works focused on visible earthworks and areas of potential interest identified by the desk-based assessment as locations where the scheme was most liable to have below ground impacts on archaeological remains. The evaluation confirmed expectations of the desk-based assessment, identifying activity from the prehistoric through to the post-medieval period. Of particular interest was an area of medieval or earlier inhumation burials

to the immediate west of the present boundary of the churchyard.

Following discussions between Ed Wilson (Senior Archaeologist, Environment Agency) and Mike Glyde (Historic Environment Planning Officer, Worcestershire County Council), an archaeological project was commissioned to undertake an excavation of all inhumations and associated deposits within the impact depth of the new access road prior to construction.

The excavation covered the entire footprint of the access road running parallel to the western boundary of St Mary's Churchyard. A watching brief was subsequently undertaken on other

groundworks in areas identified by the desk-based assessment as of potential archaeological significance; notably the strip for the access road between the terrace plateau down to the Hatfield Brook and the sub-station footings adjacent to the brook

Lastly, an earthwork survey of the immediately surrounding area and present churchyard was completed to create a detailed topographic plan, to tie results in to the local landscape where possible.

Figure 2: Excavation of the access road through the graveyard at Kempsey



Figure 3: Archaeology watching brief on the access road, Kempsey

Results

The most visible element of this scheme is the grassed embankment which although a 'new' landscape feature at this particular location is in keeping with many historic flood embankments located along considerable stretches of the River Severn; thus the broad landscape character of the area as riverside pasture on the edge of the village is successfully preserved by the scheme.

The evaluation and subsequent excavation revealed that the original churchyard had extended further to the west than the current one. At least five phases of burial were present and a total of 69 graves were identified, of which 55 lay within the impact depth of the access road so were fully excavated with the remains being removed for detailed analysis before reburial.

Bones from four individuals were radiocarbon dated and these provided a date range of 870 - 980 through to 1040 – 1260 AD. Stratigraphically earlier graves were also identified but not excavated as they extended below the impact level of the road. Associated artefacts from the graves largely dated from the mid to late 12th century, although two sherds of Late Saxon pottery were also recovered. Historic documents indicate that a Minster church was established here before 799 AD, and that a Bishop's Palace was built early in the 9th century and it seems probable that this area of the graveyard was in use during the early medieval period.

A later ditch containing 13th to mid 14th century pottery post-dated and truncated the graves and almost certainly represents a former boundary of the churchyard (the modern boundary lies to the east). Medieval building debris, largely of 13th to mid 16th century date, within an extensive later soil deposit is liable to be associated with the demolition of the Bishop's Palace, which is thought to have been pulled down by 1695 AD.



Figure 4: Remains of two members of Kempsey's early medieval population

Assessment of the human remains for condition, completeness, age, sex and pathology has been undertaken and further analysis is planned at the time of writing. Assessment has indicated that the majority of the individuals were adults and, where gender could be determined, males and females were present in almost equal numbers. Detailed analysis will reveal the age and sex of many of the bodies recovered and hopefully will provide information on origins, migration and diet of the local community some 1000 years ago.

These human skeletal remains, the associated burial ground and earthwork features are a unique source of archaeological data, being the first recorded archaeological evidence from the Late Saxon and early medieval period in Kempsey. The project will be published online as part of the Worcestershire Archaeology Research Reports series, with a summary report

in the Transactions of the Worcestershire Archaeological Society.

Outcomes

The Kempsey Flood Alleviation Scheme provides a great example of the Environment Agency working in partnership with the community (Kempsey FLAG) and historic environment professionals to provide a positive outcome for all. **The project demonstrates how early consultation and the completion of a thorough**



Figure 5: Memorial erected by the community of Kempsey to commemorate their Anglo-Saxon and medieval forebears. © Robert Hedge

archaeological assessment well in advance of the eventual implementation of the scheme facilitated the successful implementation of a staged programme of archaeological fieldwork. This successfully mitigated the impact of the scheme on important remains, enabling those

that were to be damaged during construction to be fully excavated well in advance of construction thereby enabling the construction programme to proceed without interruption or unforeseen costs.

In archaeological terms, the project has provided a rare opportunity to investigate an early medieval rural cemetery. The detailed analysis of the human remains will provide important information on the diet, mobility and health of the local community which is liable to be of considerably more than local interest and contribute to national research themes. Once the research is completed these remains will be re-interred in the church graveyard.

This project also had a wider benefit. The historic environment connects communities to their landscape and their past and, if managed correctly, can provide additional benefits to the public in a way which is not restricted solely to reducing the risk of flooding. **This is demonstrated here by the public engagement with the archaeological process and the decision of the Kempsey FLAG to erect a memorial stone in the Church meadows close to where the Anglo-Saxon and medieval bodies were excavated.** This memorial will help the current and future population of Kempsey to understand and appreciate the long history of their village promoting a sense of place and community.

Upton-upon-Severn

Background

The town of Upton-upon-Severn is located on the River Severn and like most settlements located along the river has a long history of flooding, with over 70 floods recorded since 1970.

Figure 6: Remains of the early 17th century bridge disturbed by modern piles, Upton-upon-Severn



In 2005 the Environment Agency initiated the trial use of temporary flood barriers along the waterfront area of the town. These reduced flood impacts for a number years leading to the EA working with the community to develop a permanent flood scheme to replace the temporary barriers. The resultant £4.4 million scheme consisted of two phases built between 2011 and 2012. This protects the most at risk properties located in two separate flood areas known as 'New Street' and 'Waterside' with 64 properties now defended from flooding.

The New Street scheme comprises an earth embankment, a new flood wall and a flood gate across New Street. The Waterside defences consist of a permanent flood wall with glass panels along its length. This is designed to maintain the view of the river while pedestrian gates enable access to the river side of the wall. There are also regeneration features such as raised walkways and a pedestrianised Waterfront area, which both maintain and improve access to the river frontage that has

historically provided the focus for trade and transport in Upton.

The approach to the historic environment

As at Kempsey, early consultation led to the completion of a desk-based assessment of the areas to be affected by the scheme (Entec UK Ltd 2008). This assessment suggested that there was the potential for construction works for the flood defences to expose part of the stone work of the 1607 or 1854 stone bridges at Upton; remains of earlier, wooden bridges were also potentially present. The assessment also suggested that the remains of former quays might survive behind the current stone wall to the river edge. It was also noted that some associated artefacts from a Civil War skirmish at Upton on 28 August 1651 may survive along the route of the proposed embankment.

In the light of the results of the DBA, it was recommended that it would be appropriate for any effects on structural remains or deposits of archaeological interest to be mitigated by a programme of archaeological sampling, recording and reporting; in this instance through

maintenance of an archaeological watching brief along the entire footprint of the flood alleviation scheme during construction. Worcestershire Archive and Archaeology Service (WAAS) was commissioned to undertake this programme work which was completed in 2011-12.

Results

The design of the scheme using glass panels and provision of new public amenities at the Waterfront effectively protected and enhanced the historic character of the area, maintaining the important visual and physical connection of the historic waterfront properties with the river.

During the mitigation work alongside the watching brief, it proved necessary to undertake two areas of open area excavation after concentrations of archaeological deposits were identified. These two areas were centred on a former graveyard, located to the east of the present A4104 road bridge across the river; and the former bridge crossing point, in front of the King's Head public house. Excavation of both areas was facilitated by contingency provisions agreed and implemented during construction.

The work provided a wealth of information. In front of the King's Head the remains of the red sandstone bridge, completed in 1609, were recorded, along with the later drawbridge, built in 1854, to replace the, by then, collapsed stone bridge. Remnants of the swing bridge which replaced the drawbridge in 1883 were also identified.

Within the former graveyard a total of 31 burials were recorded of which 24 were exhumed as they lay above the impact level for the new flood defence wall. The burials dated from the Victorian period and were generally in a good state of preservation, allowing full osteological analysis, which has revealed extensive information about the age demographic, health and socio-economic status and allowed

comparison with similar groups in this period both locally and regionally. Coffin fittings, including handles, rivets, studs and bolts were recovered from several of the graves. No name plates were recovered however, and therefore no individual biographical information could be determined.

Evidence of preparation of the body for burial was present. Pennies were noted in the eye orbits of one sub-adult. This is a rare discovery; only one other example of this practice has been identified in the archaeological record for the post-medieval period in Britain. The practice of placing pennies over a deceased person's eyes may stem from the practicality of holding the eyes shut before rigor mortis set in. Myths about needing a coin to pay the ferryman date back to ancient Greece and can be traced into the Medieval period in Britain, but physical evidence of this is rare.

Outcomes

The watching brief and contingency excavation successfully identified and recorded below ground archaeological deposits impacted upon by the scheme. Of the two excavation areas, the location of the 17th bridge had been noted by the desk-based assessment, although preservation was unexpectedly good. In contrast, the presence of the former graveyard was entirely unexpected and had not been anticipated by the assessment.

In both instances there was some disruption to the progress of the construction team and additional costs were incurred; the potential disruption was however minimised due to the presence of an historic environment advisor within the EA team who facilitated variations in costs and programmes and rapidly secured the exhumation licence required. It was, however, unfortunate that a number of the burials and the remains of the bridge had been disturbed prior to investigation by piles inserted during the initial stages of the construction programme.

Figure 7: Burial with pennies in eye sockets and porcelain buttons across the torso. Upton-upon-Severn



In hindsight, it is evident that some evaluation trenching of this area prior to construction might have been advisable; however, although trenching was undertaken on other sections of the route, restricted access and health and safety issues in the waterside area had led to a decision not to undertake such pre-construction work. More efforts would undoubtedly have been made to overcome these difficulties had the desk-based assessment identified the presence of the graveyard. Unfortunately, although cartographic sources were consulted as part of the process, the DBA did not identify the graveyard despite the fact that it is clearly shown and marked as such on the 1st edition Ordnance Survey map of 1885. This graveyard took the form of a roughly triangular portion of land, between the more north-westerly previous alignment of Church Street and Church Cottages, set back approximately 15m from the river bank. Subsequent research has revealed that this was a graveyard extension established in 1836, and used until 1865-6. This would have been disturbed during construction in 1940 of the current bridge but no records exist to indicate what was done with any burials that would have been disturbed at this time. It is not

evident why the graveyard was not noted at assessment and clearly had it been, then a different mitigation strategy would have been implemented to enable this to be evaluated and excavated prior to insertion of piles and commencement of construction.

Figure 8: 15th century bridge abutment, Bewdley



Bewdley

Background

The historic town of Bewdley has a long history of flooding with major floods recorded in 1947, 1965, 1998, 2000, 2002, 2004, 2008 and most recently in 2014. The largest flood in living memory occurred in 1947, when a water level of 5.8 metres above summer levels was recorded. In November 2000, the worst flooding for over 50 years hit the town. Over 140 properties were flooded, many to a depth of over 1.5 metres and a section of the stone quay wall in Severnside North collapsed. Water levels were 5.3 metres above summer levels. The town was extensively flooded three times in the space of six weeks.

Records show that some properties are likely to have been flooded at least 30 times in the last hundred years. Approximately 175 properties in the town are at risk of flooding from a 1 in 100

year flood event (ie. a 1% chance of happening in any one year). There is disruption to traffic and to public transport; amenities cannot be reached, trade and commerce in the town is lost and affected home and business owners suffer great upheaval and distress.

The areas of Bewdley most severely hit by flooding are Severnside North (around the bridge crossing on the western side of the river) and Severnside South (around Wribbenhall and Beale's Corner on the east bank). After the 2000 flood, it was decided that an effective flood defence needed to be constructed to reduce flood risk for these parts of the town and enhance the Georgian town and its 18th Century quay. Permanent flood defences had been considered some years earlier in 1995, but following consultation with the local community, the Environment Agency responded to local concerns about the visual impact of

such defences by designing a scheme which would reduce the risk of flooding whilst preserving the character and visual amenity of the historic quayside.

The resultant scheme was constructed in two phases between 2002 and 2005 with funding from the Department for Environment, Food and Rural Affairs (Defra). It used a mixture of permanent defences alongside a demountable aluminium barrier system termed by the EA 'the invisible defence'. Such demountable defences have been widely used in elsewhere in Europe but were innovative in the UK. These represented a major engineering scheme, involving the construction of massive underground flood walls (using 7m deep piles) topped by the German-designed removable aluminium barriers. These are secured to steel plates in the top of the walls when floods are expected. The overall scheme cost some £11m and comprises 630 metres demountable defences plus 200 metres of permanent flood walls.

The approach to the historic environment

The design for the entire scheme was heavily influenced by historic environment concerns. Bewdley was an important historic focus for

trade along the Severn and by the 17th century had become an important and prosperous inland port. From the outset the use of temporary, demountable barriers for the greater part of the defences was the preferred option for the local community because permanent barriers would have had a detrimental impact both on the historic character and on the tourist industry through restricting access to, and visibility of, the waterfront. The historic character and amenity value of the area was also protected and enhanced in the scheme through resurfacing using original block paving and York stone slab, the placement of a new Victorian-style pedestrian guardrail along the quayside, the widening of a footpath and landscaping of one area.

At an early stage of planning, the Environment Agency also assessed the potential direct impact of the scheme on buried and upstanding archaeological remains. This was done in consultation with the Planning Advisory Section of the Worcestershire Archive and Archaeology Service. This assessment identified that the riverfront was probably first developed in the 15th century along with the High Street and the lower part of the town from Dog Lane to Lax Lane. It was also thought that the first bridge at



Figure 9: 17th to 18th century wall revealed near the present bridge at Bewdley

Bewdley, built in 1446, was aligned on Load Street, and that a later bridge, built in 1483, lay further downstream, between projections in the riverside walls. There was no other evidence for medieval arrangements, with the possible exception of some undated timbers exposed in the riverbed suggested to represent quays or jetties of medieval type. The later history of the riverfront was better known from more abundant sources. Surviving fabric in three buildings suggested that the street frontage was established by the 16th century, while 18th century prints showed a quay wall along Severnside South and a row of buildings between the bridge and Load Street. Based on these findings, the assessment concluded that significant remains might be damaged by some parts of the scheme, and that a number of archaeological projects would be required by way of mitigation.

The resultant programme of archaeological works both preceded and accompanied the construction works. The first phase of the scheme, undertaken in 2001-2, affected Severnside North and Beales Corner and was accompanied by an archaeological watching brief (Miller and Darch 2002a). The second phase, along the west bank (Severnside South), followed and involved the construction of a flood barrier along Severnside South and repairs to the quay wall. Here, archaeological work in advance and alongside construction comprised an evaluation (Miller and Darch 2002b) and two watching briefs. Repairs to the quay wall along Severnside South also necessitated a photographic survey, from which a detailed elevation was drawn.

Results

The work undertaken provided much new information on the history of Bewdley's riverfront. Perhaps most significantly the quay

wall was revealed to incorporate the abutment of Bewdley's third medieval bridge, built in 1483. The remains of this abutment were substantial and remarkably well-preserved with the structure (including the core) being shown to survive to a height of nearly 4m. Following consultations between the Environment Agency, Historic England, and the main contractor, Volker Stevin Ltd, the masonry was covered with plastic foam and sheeting before the trench was backfilled. After further consultation, the design for the flood barrier was also altered so that it would curve around, rather than cut across, the abutment thus preserving this significant historic environment feature in situ.

The quay wall itself was revealed to be a complex and composite structure of 17th through to 20th century date. Aside from this, parts of contemporary and later quay walls, and the remains of several 18th century buildings were also recorded. The timber structure in the river bed was dated to the late 16th or early 17th century and interpreted as a jetty. A small but broadly representative assemblage of artefacts was also recovered from later deposits.

Outcome

At Bewdley, the potential conflict of building a 21st century flood defence system along an 18th century listed quay, next to twelve listed properties and a Thomas Telford Grade I bridge was successfully solved through early consultation and carefully considered design.

The scheme that resulted did not visually impact on the historic quayside and river frontage and in addition there was the added bonus of a new open space with handrails, steps, ramps and walkways, which conceal the line of the flood defences, but give easy access to the riverside thus enhancing the amenity value of the area.

Figure 10: Environment Agency demountable defences in action at Bewdley. © Dave Throup



Similarly, early consultation and the completion of a desk-based assessment enabled a staged and informed approach to investigating below ground deposits directly impacted upon by the development. Although, unexpectedly well-preserved remains of the medieval bridge were identified, good lines of communication established early in the project facilitated agreement of a change in design to allow these important remains to be preserved in situ.

Taken together with existing information, the results have allowed the development of Bewdley's quayside to be described in considerable detail. No other historic quaysides in the West Midlands have been investigated to the same extent, and the preservation of 15th to 18th century remains at Bewdley is likely to be exceptional. For these reasons, the results are of regional, if not national, significance.

Unfortunately, whilst the scheme on the west bank has been a great success from an historic

environment perspective, issues have arisen with the scheme on the east bank at Beales Corner. On this side of the river, temporary barriers are erected during flood events. These protect 19 properties. They require both sufficient time and resources for effective storage and deployment, and it is an inevitable consequence that both staff and time are in short supply during major flooding events. Temporary defences are now therefore considered by the EA as only suitable as short-term measures – and are no longer viewed as the most appropriate or cost effective measure. Options are now being explored for replacing the temporary barriers on the east bank through a Property Level Resilience (PLR) scheme. This has implications for the historic environment and some concerns have been raised from the local community about how this might be implemented. Historic England, the Environment Agency and local conservation officers have been working together to find PLR solutions that are compatible with the historic environment.

Conclusions

Flood alleviation schemes are highly sensitive projects in respect of the historic environment and warrant careful consideration and design since they have a considerable potential to impact on the character of our historic towns and villages, and it is often this character that attracts tourists and investors to these places. In addition, the process of constructing these schemes has a considerable potential to damage or destroy important archaeological remains. Alongside these considerations, it is essential to ensure that effective flood alleviation schemes can be constructed efficiently and with the minimum of delay so as to deliver flood reduction measures to the most badly affected communities. In such cases, the potential for longer term impacts on the local economy arising from schemes that do not secure preservation of the historic character of an area need to be balanced against ensuring that long-term and cost effective approaches are provided in respect of reducing flood risk.

The case studies from Kempsey, Upton and Bewdley demonstrate that good practice in respect of historic environment assets facilitates the smooth and efficient construction of flood alleviation schemes, thereby helping to protect those communities affected by flooding as well as preserving and protecting our heritage. As the case studies demonstrate a range of options are available and no single solution exists, thus emphasising the need for early consultation and careful and sensitive design which is firmly based in meeting as far as possible the aspirations of all stakeholder groups involved.

The key lessons in good practice are:

1. **The key to the successful delivery of any scheme lies in early consultation between all stakeholders.** This will enable the needs of the historic environment to be identified from the outset, thus supporting the design of schemes which are sensitive to the historic character of the area affected and which allow any archaeological works required to be built into the project programme.
2. **Engagement with the Historic Environment is a good way of showing that constructors and the agencies involved are taking on board the long term importance of these areas.** The presence within organisations such as the Environment Agency, of professional heritage advisors emphasises that this is the case, ensures that such bodies are engaged from the outset and demonstrates that they are sympathetic to local community concerns and recognise the value of the wider environment.
3. **There is no 'one size fits all' approach.** Each will have its own merits and disadvantages depending on the particular circumstances of the project, the nature of the flood risk involved and the character of any historic environment assets that may be affected. These all need to be considered during the design stages so that any conflicting interests can be resolved thereby ensuring that the most appropriate scheme is taken forwards in each case.
4. **It should be kept in mind that circumstances may change over time** and therefore any scheme should assess where risks lie in respect of change.

5. **It is important to follow a process that will allow informed decisions to be made throughout the project**, highlighting potential areas of interest and enabling any archaeological fieldwork stages that are required to be designed, programmed and implemented in good time within the development schedule.
6. **The planning and design of any archaeological fieldwork should be based around a well-researched and thorough desk-based assessment (DBA)**. The DBA should form part of any Environmental Impact Assessment undertaken. It should be capable of supporting the decision making process and helping identify appropriate techniques to employ.
7. **The aim throughout should be to protect historic environment assets that might be affected wherever possible through sensitive design**, and (where preservation is not possible) to secure appropriate programmes of investigation and recording thus minimising risks in dealing with historically and economically valuable resources as well as places people live and work.
8. **Approaches taken should minimise the risk of unexpected discoveries** being made once construction is underway since these are liable to result in delays and considerable additional costs.
9. **The early establishment of good lines of communication and understanding between all parties has benefits which will last throughout the project**, supporting the effective resolution of any issues thrown up by changes in design or the discovery of unexpected remains.
10. Lastly, **the results of the archaeological work can have unexpected and lasting benefits for the community** as shown by the people of Kempsey who commissioned a commemorative plaque to their Anglo-Saxon and medieval ancestors who were excavated as a result of the work undertaken prior to construction of their scheme.

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Mapping the Historic Environment for Consideration within Flooding and Disaster Planning:

A geospatial methodology for curators of historic environmental data to facilitate engagement with non-heritage stakeholders

Summary

Recent endeavours within Worcestershire County Council have highlighted that the inherent complexity and abstract-nature of historic environment information has often precluded appropriate consideration of non-designated assets by non-heritage bodies and decision-makers within disaster planning and response. This study therefore aims to explore means through which heritage practitioners within local authorities and statutory agencies could rectify this issue.

This study has developed and delivered a mechanism through which historic environment features that are either at risk from flooding (e.g. historic buildings within the flood zone), or remain influential to local hydrology (e.g. industrial water-management systems) can be highlighted to external parties. The methodology and product are inspired by the 'SHINE' framework, devised to map and categorise features for potential inclusion with agri-environmental schemes.

Just over two-thousands records pertaining to the historic environment of Worcestershire have been created, synthesising key information on: the location and extent of the asset(s) in question; the form and typology of the buildings or monuments; the type of flood-risk threatening the asset(s); whether there is opportunity for enhancement or integration of historic environment features from or within a flood-alleviation scheme respectively; and the presence or absence of statutory designations.

The product has been disseminated to services engaged with flood risk management and response across the county. This will allow rapid identification of key constraints, risks, and opportunities in respect of the historic environment; thus, facilitating a less reactionary and more proactive relationship between those engaged with flood alleviation, mitigation and recovery, and heritage specialists. The dataset will be curated by the Worcestershire Historic Environment Record.

The following text outlines the justification and technical framework for this approach in the hope it can be replicated for the betterment of flood-affected heritage beyond Worcestershire.

Introduction

While the Worcestershire Local Flood Risk Management Strategy and Worcestershire Surface Water Management Plan (SWMP), developed by Worcestershire County Council, aspired to consider the historic environment within their assessment frameworks, the consideration of non-designated assets was not deemed feasible in a sufficiently efficient and cost-effective manner. This was due to the complex and abstract nature of information held by HERs; hindering assessment by non-historic environment professionals. A substantial risk was therefore identified, that both threats to, and opportunities surrounding, a plethora of historic and archaeological assets in the context of disaster planning were to be overlooked. For instance, the potential for restoration and utilisation of historic water-management features such as watermeadows, mill-systems, moated sites, or ponds within contemporary attenuation and alleviation schemes. Further, while many historic environment features may not qualify for statutory designation within Historic England's criteria for protection, they are often of considerable significance to local environment and landscape character; and may therefore offer significant opportunities for the improvement of a locality through conservation or enhancement under integrated flood-risk or surface-water management strategies.

This project proposed to deliver a methodology and geospatial 'product' aimed at rectifying this potential lack of representation of undesignated assets and landscapes. The approach, inspired by a successful scheme developed within agri-environmental frameworks ('SHINE' – see text box), has facilitated access to relevant historic environment information by individuals, authorities and agencies tasked with assessing environmental impact and undertaking risk analysis in respect to flooding within the county. The product will provide a rapid means of identifying and mapping form, constraints, risks and opportunities in relation to known heritage

assets; ensuring adequate representation of both designated and undesignated features is secured.

This case study has developed and applied a derivative of the SHINE methodology, aimed at identifying and assessing historic environment features of form and/or locality deemed potentially sensitive from, or of benefit to disaster management in respect to flooding, in place of agri-environmental potential. The project has generated a geospatial GIS-based product: a synthesised inventory of the HER features, enhanced with key attributes pertaining to historic environment form, constraints, risks and opportunities to secure more informed flood-risk assessment, surface-water risk-analysis, flood mapping, flood mitigation, and disaster-response strategies.

The inventory does not provide a detailed assessment on the specific threats and opportunities presented by individual assets within their particular environ. Instead, it delivers key indicators of form, risk and potential, for consideration by non-heritage specialists undertaking both localised and strategic planning for flood mitigation, adaption, or response. The creation of the inventory has been designed to flag historic environment assets, dynamics, and sensitivities within risk-assessments and disaster-response strategies, which contained little of such considerations prior to the project.

It was recognised that the rapid identification of key constraints, risks, and opportunities was the prime priority of disaster planning-and-response, superseding detailed understanding of the provenance of the assets in questions. The inventory does not therefore aim to supersede the HER as the primary source of information on the historic environment, nor will its examination be advertised as a comprehensive mechanism of consultation in respect of archaeological mitigation within development control. Rather, it will 'flag' constraints and opportunities to non-specialists practitioners

and planners, instigating earlier consultation with the local authority's HER and Advisory Service and relevant statutory agencies; thus, facilitating more informed decision making and enhanced environmental outcomes through constructive conservation and archaeological mitigation.

It is anticipated that by clearly sign-posting pertinent risks and opportunities to/from historic environment assets at earlier phases of the development process, a less reactionary and more proactive relationship can be established with those making key decisions on landscape change through alleviation, mitigation and recovery. Consideration of historic environment in respect of flooding will therefore not be constrained to consultation through development control, and instead be further integrated within holistic planning frameworks of floodwater management and blue infrastructural development.

Finally, consultation of HERs and heritage professionals during flood events by those responsible for rapid response events has been largely negated by the substantial temporal and labour constraints placed upon them. The historic environment inventory has been designed for ease of integration within existing 'immediate recovery packages' : collated datasets, documents and guidance curated by the local authority and Environment Agency for immediate dissemination to those tasked with instigating response and recovery mechanisms during flooding.

The creation of datasets pertaining to flooding can be an inherently politically and socially volatile process, particularly when there is a perceived risk of blight to property value and insurability. The dissemination of any historic environment evidence-bases which considers flood risk as a key attribute must therefore be undertaken with the upmost sensitivity to avoid accusations of erroneously representing threat or impact.

The source-data utilised for this case study is predominantly derived from recognised Environment Agency and Local Authority modelling of flood risk, and should therefore largely conform to indicators already in the public realm. Careful management of the evidence base must however be achieved to ensure it is always considered within an appropriate contextual framework. Curation and ownership of the dataset should ideally therefore remain with the respective historic environmental authority to ensure its usage remains suitably informed.

SHINE

Selected Heritage Inventory for Natural England

The Selected Heritage Inventory for Natural England (SHINE) is an endeavour instigated by Natural England, and coordinated by the Association of Local Government Archaeological Officers (ALGAO) aiming to produce a single, nationally consistent dataset of manageable undesignated historic environment features from across England, which could benefit from management within Environmental Stewardship Schemes. The SHINE methodology sought to produce a new dataset, derived from HERs, which provided standardised geospatial information on heritage assets that may be applicable to management through European Union subsidy alongside indicators of their respective significance. This dataset intends to efficiently and cost-effectively inform environmental agencies, consultants, and advocates engaging with Environmental Stewardship who do not specialise in the historic environmental discipline on the presence, potential, and significance of heritage assets within a particular locality; thus, enhancing their capacity to provide adequate and sustainable advice towards their potential for sustainable management and conservation.

SHINE encouraged the creation of a polygonized dataset, primarily representing the presence of historic environment features within a particular locality, rather than detailed information on a specific asset's provenance, form and condition. The allocation of 'SHINE' designation was determined through a range of criteria, including: the presence of substantive, verifiable anthropogenic remains; the presence of monuments of a known character and form, quantifiable through the Historic England thesaurus; the ability to closely map said features with polygons definitively representing a spatial extent; and the presence of a clear or potential benefit to historic environment features through the Environmental Stewardship frameworks.

To date, the SHINE methodology has been applied to a large proportion of the English Landscape, identifying and recording a plethora of historic environment assets which may qualify for management under Environmental Stewardship schemes. Within Worcestershire, the assessment of targeted features and landscapes within the county was funded by Natural England, producing over 1100 polygons, which define the extent and significance of over 3000 historic environment features. The successful and ongoing application of the SHINE methodology has delivered a dataset, which can be rapidly and effectively consulted in relation to potential agri-environmental schemes within the rural landscapes of the county.

Method

The synthesis, appraisal and dissemination of historic environment assets pertaining to flood risk and management was undertaken in five stages:

- i. Collate and analyse sources of data on flood risk, historic environment, and land-forms.
- ii. Create a bespoke database 'Designation' record within HBSMR linked to an ArcMap shapefile product for generation of 'FLOOD' records.
- iii. Identify, extract and collate candidate features for inclusion within the selected inventory of historic environment assets.
- iv. Appraise and map historic environment features deemed at risk from flooding, and/or present opportunities within flood alleviation planning and management.
- v. Create and disseminate bespoke data 'package' for use within disaster planning and response.

Source Data Collation

Identification of areas of known risk from pluvial or fluvial flooding was achieved through collation and synthesis of numerous pertinent digital, cartographic and literary sources. These included: the Environment Agency datasets modelling risk of flooding from rivers, reservoirs, or surface water; spatial data derived from historical accounts of flood events and respective extents; and Local Authority records and modelling including the 'Floodspots' of the Worcestershire Surface Water Management Plan and Local Flood Risk Management Strategy. Finally, information was derived from recent WAAS funded NHPP projects 'Toolkit for the rapid assessment of small wetland sites' (Pearson, 2014) and 'Putting the Palaeolithic into Worcestershire's HER: Creating an evidence base and toolkit' (Russell & Daffern, 2014) which mapped features including osier beds, marshland and palaeochannels, that may present distinctive risks of localised surface water flooding.

The primary source of historic environment information was derived from the Worcestershire Historic Environment Record (HER), a geospatial database comprised of records pertaining to over fifty thousand features of varying provenance, alongside links to thousands of associated 'Events', 'Consultations' and sources. This was enhanced

with: the county Historic Landscape Characterisation (HLC) dataset; historic Ordnance Survey mapping; digital contour mapping; historic aerial photography; digitised tithe and enclosure mapping; and records of statutory designation including Listed Buildings, Scheduled Monuments, Conservation Areas, Registered Parks and Gardens, and Registered Battlefields.

Supplementary sources included the British Geological Survey data of bedrock and superficial deposits; information on soil character from the Land Information Service; Light Detection and Ranging (LiDAR) and orthorectified aerial photographs of flood events from the Environment Agency; and data pertaining to various issues of landscape-management including soil erosion risk.

The source data was collated into a bespoke GIS project, utilising ESRI's ArcMap 10.1.

Creation of Bespoke 'FLOOD'

Designation Records

Bespoke forms and tables were generated within the Worcestershire HER, held within the exeGesIS HBSMR software framework, to facilitate the creation of the synthesised records of historic environment assets. The records

were designed to allow rapid recording of the various attributes pertaining to form, designation, risk, and opportunity, alongside sufficient descriptive text for reference by users, location information, and links to the HER records in question. The database linked directly to an ArcMap shapefile, which populated with attributes upon completion. The shapefile was designed to form the primary project 'product', to be exported and amalgamated into a geospatial package of historic environment information.

The attribute-fields for each 'FLOOD' record are as follows:

<i>Attribute</i>	<i>Description</i>
<i>FLOOD_UID</i>	Unique reference number. E.g. <i>DWR9457</i> .
<i>Name/Title</i>	Name of record, summarising monuments and location.
<i>Description</i>	Summary of monument/feature form, provenance, and other pertinent information.
<i>Monuments</i>	Unique HBSMR reference(s) of mapped HER features.
<i>Location</i>	National grid reference and local authority within which the feature(s) is situated.
<i>Form</i>	Form of the historic environment asset(s). E.g. "Above ground feature(s)"; "Below ground feature(s)"; "Historic Building"; or combination of the three
<i>Designation</i>	Presence of statutory designated features or areas to highlight potential development constraints. E.g. "Site" (Listed Buildings, Scheduled Monuments; or "Area" (Conservation Areas, Registered Battlefields etc.); or both.
<i>Risk</i>	Defining the risk to feature(s) from fluvial and/or pluvial flooding
<i>Opportunity</i>	Whether or not there may be opportunity for the heritage asset(s) to contribute to flood mitigation schemes through constructive conservation and/or blue-infrastructure strategies. E.g. attenuation within historic ponds, or channelling of excess water along man-made watercourses such as leats.
<i>Heritage Gateway</i>	Auto-generated hyperlink to the respective Heritage Gateway record(s) for linked HER features, providing rapid access to detailed historic environment information if required.

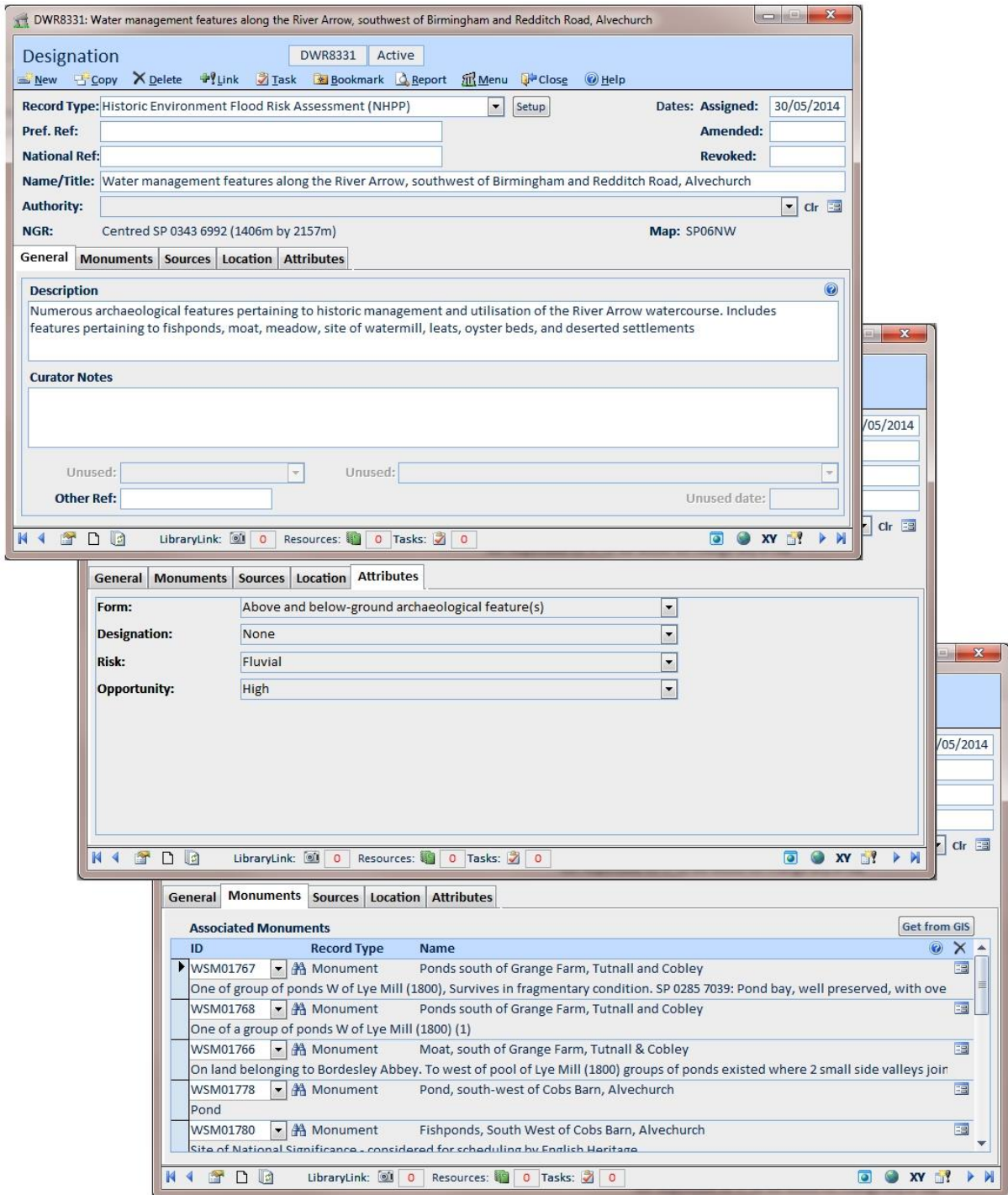


Figure 1: Bespoke designation record within HBSMR

Identification, Extraction and Collation of Candidate Features and Landscapes

To enhance efficiency of the synthesis of the HER for flood-risk and flood-alleviation assessments, the database was queried and filtered to provide a sub-set of candidate features and landscape-components. This was undertaken in two stages: selection by location relative to known areas of flooding and flood-

risk; and selection based on feature typology and provenance. This ensured all features that were both deemed at risk from flooding, alongside those that provide opportunities for flood alleviation, mitigation or management through restoration or constructive conservation were highlighted, surveyed, and incorporated where appropriate.

A spatial query of the Worcestershire Historic Environment Record was undertaken relative to

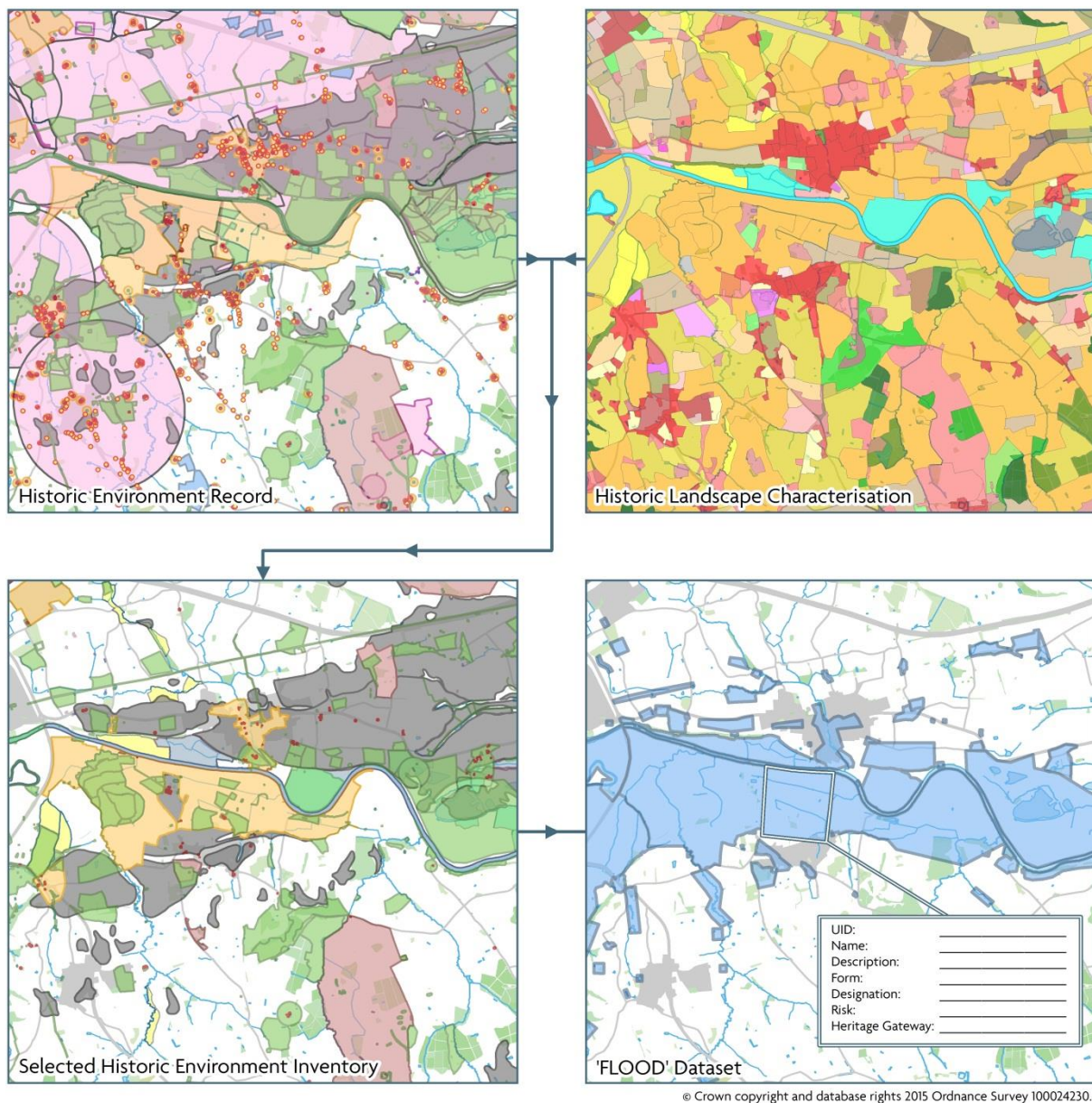


Figure 2: Synthesis of HER and HLC datasets into the Historic Environment Inventory and consequent 'FLOOD' dataset.

an amalgamation of the aforementioned flood-risk datasets. This was undertaken in order to extract all known historic and archaeological assets, buildings, and landscape-components, which are predicted to be at risk from fluvial or pluvial flooding due to their locality, alongside those areas that have historical records of flooding.

Further candidate features were identified through selection of HER records relative to a bespoke subset of the Historic England 'Thesaurus of Monument Types'. This extracted all known features of typologies and form which in some way pertain to water-management (e.g. leats, millponds, sluices), watercourses (e.g. bridges, canals, mill-sites), or other extant/historic hydrological systems (e.g. palaeochannels, meander movements).

The selected historic environment inventory was supported through a custom extract of the Worcestershire Historic Landscape Characterisation (HLC) data. This incorporated areas mapped as modern or historic HLC Types: 'Reservoir', 'Artificial Lake/Pond', 'Watermeadow', 'Bog', 'Marsh', 'Natural Open Water', 'Canal/Lock/Basin', and 'Meadow'. While many HLC polygons do not provide information on the specific presence, condition and form of associated historic environment features, its inclusion within the data 'package' has provided an effective means of promoting the consideration of historic land-use and character as fundamental components of managing flooding within the contemporary landscape.

This process created an inventory of around twelve-thousand HER records for assessment during the consequent 'mapping' phase, supported by the HLC and landscape-scale records, including assets such as historic parkland and geological deposits of palaeoenvironmental value.

Selected Inventory of Historic Environment Assets

Appraisal and mapping of candidate features into a selected inventory of historic environment assets was achieved in four stages:

1. Appraisal of features associated to the 'floodspots' of the Worcestershire Surface Water Management Plan (prioritised for completion prior to the imminent instigation of the Local Authority 'scoring' of priority sites).
2. Appraisal of features at risk from fluvial flooding along rivers and their tributaries
3. Appraisal of features identified via their typology and provenance
4. Appraisal of remaining historic environment features

The systematic assessment of features was achieved through the creation of mechanisms respective of each of these stages. 'Floodspots' were recorded sequentially within parishes; a matrix of 1km² grid squares was generated aligned to the watercourses; and remaining features were prioritised by their typologies (e.g. millponds > ridge and furrow). Recorded features and areas were marked as surveyed once appraised, regardless of inclusion within the selected inventory of historic environment assets.

Each candidate features was appraised relative to the attributes outlined in the previous section. If deemed at risk from flooding, as influential towards local hydrology, and/or presenting opportunity for incorporation or conservation within alleviation schemes, a 'FLOOD' record was created accordingly. Features were only mapped if they were verifiably extant (not conjectural) as historic environment assets.

Multiple candidate features were mapped within a single 'FLOOD' record where they were either located in the same vicinity, and/or were related

through their form or function. Related or closely-located features were not synthesised where they presented contrasting 'Risk' or 'Opportunity' ratings to ensure clarity when the final 'product' is utilised for disaster planning and response. For instance, a mill complex situated adjacent to a river with extant structural assets and water-management system would result in two distinct records: one for the mill-buildings which are at risk from fluvial flooding, with low potential to contribute to mitigation or alleviation schemes; and another for the various millponds, sluices, weirs, leats (etc.), which while also at fluvial risk, may offer opportunities through their enhancement or constructive conservation. In total, 2283 'FLOOD' records have been created with complete geographic and typological coverage of the county and its known historic environment features respectively.

While not the priority of the mapping exercise, this process allowed for further enhancement of the County Historic Environment Record through the addition of newly identified sites, and enhancement of existing monuments with updated information and attributes. Further, the development of the bespoke HBSMR infrastructure is facilitating the legacy of the selected inventory, allowing the appraisal methodologies to be integrated within the day-to-day workings of the HER; thus, ensuring the dataset evolves and expands appropriately in future as new candidate features are identified within the county.

Creation and dissemination of historic environment 'package' for disaster planning and response

The products have been disseminated to Worcestershire's Local Authorities for use within endeavours such as the impending 'Risk Analysis Mapping' of the Worcestershire Surface Water Management Plan. The data will also be hosted by WCC, and made accessible 'live' to these services to allow rapid consultation by planners

and practitioners on a day-to-day basis to encourage and perpetuate the consideration of the historic environment as a primary factor in flood-risk assessment and mitigation. Statutory agencies and cross-organisation action groups, most notably the Environment Agency, and Worcestershire Strategic Flood Group are being encouraged to incorporate the dataset into their aforementioned disaster-response and immediate-recovery data and guidance packages.

The final dataset has been delivered in the form of a GIS shapefile, allowing for rapid, flexible, and bespoke integration into existing environmental models and GIS frameworks used for disaster planning and response. The shapefile defines the geospatial extents of pertinent historic environment features or landscapes, providing concise information on the form and provenance of the historic assets, alongside the attribute data highlighting risk, opportunities, and constraints. Each polygon features auto-generated hyperlinks to the relevant Heritage Gateway record(s), should more detailed information be required on specific assets.

The data is packaged alongside the various guidance documents generated by this project, and a range of other sources deemed essential to managing risk and assessing impact on, and from, the historic environment in relation to flood events. This includes 'checklists' derived from policies of national, county, and statutory provenance to encourage and ensure proactive engagement and consultation of historic environment specialists throughout these processes.

A snapshot of the 'FLOOD' dataset is stored within the project's digital archive, available from the Worcestershire Historic Environment Record.

Conclusion

"Historic assets are a fragile and non-renewable resource, the significance of which can be reduced or lost as a result of poorly conceived changes. Decisions on how, when or whether to make adaptive changes to historic assets in order to enhance their resilience to climate change should be based on a good understanding of the pressures they are likely to face..."

...It should always be recognised that poorly informed decisions about adaptation can lead to badly specified measures that not only diminish the significance of historic assets but also reduce their flexibility to respond to future climate change. It must also be recognised, however, that a 'no regret' approach does not equate to 'no action', which risks failure to make necessary adaptations."

Historic England. 2008. *Climate Change and the Historic Environment*. p.13

As outlined within the companion case studies, low levels of engagement and/or access to historic environment expertise is often resulting in poorly informed strategic planning for flood alleviation & response by local authorities and statutory agencies. This is, therefore, negating sufficient consideration of both the risks of flooding to-and-from historic environment features; alongside the opportunities they may present for incorporation into flood alleviation or attenuation schemes. This has ensured that a purely constraint-led approach prevails within many governmental authorities, considering solely threats to designated assets. This results in greater risks of erosion of landscape character, loss of significant areas of research-potential, and the degradation of a broad range of environmental amenities.

Pro-actively creating and promoting mechanisms to address such issues of representation and awareness must therefore be a priority for the historic environment sector. This case study has highlighted one potential solution, inspired by the SHINE initiative and its continued benefits to historic environment in respect of agri-environmental management. The

methodology has potential for national application; however it is recognised that a means of sufficiently resourcing an intensive process of mapping to formulate the baseline evidence-base will be required, in order to facilitate the day-to-day enhancement of the resource through HERs. With SHINE, this has been achieved through grant funding from Natural England: there may therefore be scope to explore similar arrangements with agencies engaged with flood risk and response.

WAAS will continue to promote the approach and new resource within the Worcestershire Local Authorities and to the statutory agencies, building upon established working-relationships forged through cross-organisational initiatives including the Worcestershire Flood Action Group, the Worcestershire Local Nature Partnership, and the Worcestershire Green Infrastructure Framework. Critically, it is aimed that the delivery of the evidence base to such partners will not only facilitate enhancement of their respective datasets, but also continue to promote a greater consideration of historic environmental assets and expertise as significant facets when planning for, and responding to flood-risk.

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Russell, O. and Daffern, N. 2014. *Putting the Palaeolithic into Worcestershire's HER: creating an evidence base and toolkit*. Worcestershire Archive and Archaeology Service for Historic England. WAAS Project **3951**. Historic England Reference **6396**

Assessing the Past and Potential Impact of Flood Events on the Historic Environment

Critical analysis of historic environmental practices to support at risk communities and enhance their resilience to flooding

Summary

This study has aimed to quantify the extent and form of impacts on communities occupying historic settlements at risk from flooding; alongside highlighting key issues with regards to their engagement with the heritage management and historic environment sector. The results and detailed analysis aim to inform how historic environment curators can improve resilience within at risk communities.

Consultation was undertaken through the dissemination of questionnaires, guided 'flood-walks' with advocacy groups engaged with flood risk management; and through direct engagement with individuals, organisations, and curators tasked with minimising and/or responding to flood events. Statistics pertaining to use of online guidance were also assessed.

The major issues identified include: a lack of awareness amongst the target audience of key guidance on flooding and historic environment assets; low levels of consultation with heritage specialists before, during and after flood events; variable perceptions on the roles of heritage practitioners, and consequently the benefits of engaging them in planning for and responding to flooding; poor communication between the various heritage and non-heritage authorities attempting to support at risk communities; and limited recording and reporting of changes to historic and archaeological fabric for purposes of reconstruction, restoration, and mitigation. Such issues present threats to the integrity of significant historic assets and areas both from the direct impacts of flood waters, alongside poorly informed works to alleviate or mitigate damage. While serious concerns have been highlighted by this project, all are rectifiable. In respect of flood risk and community resilience, a number of opportunities to enhance both the historic environment, and the mechanisms through which it is managed, have been identified.

In light of this study, the following recommendations are made to Historic England:

- 1. Instigate a marketing initiative to ensure the target audience is aware of the 'Flooding and Historic Buildings' guidance, and other information and advice available on the Historic England website, and utilise resources and historic environment expertise accordingly.*
- 2. Commission a survey of contractors engaged in repair and/or modification of historic properties in response to flooding to formally quantify their awareness and use of historic environmental advice and guidance.*
- 3. Develop and commission a programme of 'HELM' training events for both heritage and non-heritage practitioners on engaging with, supporting, and building capacity within communities occupying historic settlements at risk from flooding.*
- 4. Explore new, and promote existing, mechanisms for reporting change to historic or archaeological assets as a result of flood damage or mitigation.*
- 5. Commission pilot studies through National or Regional Capacity Budgets to develop methodologies of community-led historic environment assessment to be undertaken by local Flood Groups during appraisal of water-management and/or at risk features within their respective localities.*

Introduction

Worcestershire is particularly vulnerable to river and surface water flooding, with large areas of the countryside and its numerous historic towns and villages being regularly inundated. The impact on local communities is therefore substantial, both emotionally and economically.

It is the members of these communities who constitute the primary custodians of the county's distinctive historic buildings and historic environment features: owning and often occupying these assets, and largely leading and financing their conservation and/or maintenance. It is therefore essential for us to garner insight into how such individuals or groups address issues of flood risk-and-repair in order to better understand the historic, current and potential future roles of heritage authorities and agencies within these processes.

This project aimed to assess a range of key questions pertaining to risk to historic architectural and archaeological fabric. For instance: What is the form and extent of damage commonly incurred to buildings or sites during flood events? And what are the means and measures through which assets have been commonly repaired or modified to alleviate historic or future impact respectively?

Such questions are significant - both ill-informed preventative measures and repairs/restoration following flooding present major risks to the historic environment. This can harm not only the fabric of individual buildings or areas, but also localities' distinctive and valued character, often key assets in their socio-economic appeal. Furthermore, inappropriate works can result in unforeseen and substantial long-term costs, for instance: the overly rapid drying-out of a timber framed building causing consequential structural problems; or the replacement of breathable lime plaster with a modern non-porous alternative resulting in substantial problems with damp; or more indirectly erosion to local

amenity through the use of modern materials that erode local distinctiveness and sense of place.

Further, the project has aimed to critically assess the mechanisms of engagement employed by heritage services within local authorities and pertinent statutory agencies to support communities dealing with flood risk management and repair. Have heritage professionals been a help or hindrance during processes of repair and/or mitigation in the eyes of affected communities? To what extent has key guidance from heritage bodies and advice from heritage practitioners been sought, acquired, and utilised? What is the general perception of historic environment professionals in regards to their potential contribution towards managing flood risk in the local area? And perhaps most crucially, to what extent have these levels of engagement, perceptions, and absence/presence of working-relationships facilitated a positive-or-negative outcome for local communities and their respective localities.

A framework of community engagement has been implemented in an attempt to answer these questions, to gain fresh insights on the needs of communities at risk from flooding, and to establish more productive working-relationships in future during both times of planning for flood-risk, and responding to its impact. Several communities and community groups in Worcestershire have been consulted through surveys (posted and online), 'flood walks' with community flood action groups, and a number of direct discussions with affected parties. The results of this engagement are presented below, with key issues highlighted, and recommendations to alleviate such problems through future action by local authorities and statutory agencies outlined.

Methods of Consultation

Questionnaire

Five localities were selected for survey from across the Worcestershire districts: Tenbury Wells, Kempsey, Sedgeberrow, Childswickham and Wribbenhall. These were chosen based upon the presence of sufficient designated and undesignated heritage assets within the flood zone to facilitate critical analysis of the impacts of statutory regulation; alongside the recent occurrence of serious flood events, to secure both reliable and pertinent information on current practice.

A simple questionnaire was distributed to properties situated within the Environment Agency 'Flood Zone' modelling of potential fluvial inundation. Eight questions aimed to ascertain: the locality and designated status of the building in question; the form and extent of the impact of flood events upon the building, alongside that of any remedial action required for restoration and/or reconstruction; the extent and form of structural modification to

properties through flood alleviation and mitigation works; the extent to which the need for planning consent was required, recognised, and respected; the extent to which these works were reported to appropriate heritage authorities; and levels of awareness and consultation of key guidance documentation.

Local collection points were established in facilities such as the village shop, the local library or with an obliging neighbour, allowing surveys to be returned within a few minutes' walk of every property surveyed without expense. An alternative option to complete the survey online through 'Survey Monkey' was provided.

While the survey could be taken fully anonymously, to encourage honesty of responses, participants were encouraged to provide contact information and more detailed comments on their personal experiences. This facilitated a number of one-to-one interviews with affected individuals; garnering a deeper understanding of local issues.

Assessing the Impact of Flooding on Heritage Assets and the Historic Environment
 Worcestershire Archive and Archaeology Service & English Heritage

This survey can also be completed online at: <https://www.surveymonkey.com/s/UTLW0Q2R>

Through this survey, we are aiming to assess how effectively heritage organisations and services are supporting the adaptation and reconstruction of your historic building in response to flood risk and damage.

This survey is divided into three short sections, and should take on average **no more than 10 - 15 minutes to complete**. Each section is preceded by introductory text providing the context for the questioning.

This survey can be undertaken fully anonymously, with the provision of personal data entirely optional. Any information that is provided will be securely disposed of at the close of the project. No information will be shared with any third party organisations.

NB. We would greatly appreciate any questions marked with a * to be completed by all of those surveyed.

Section 1 of 3

In order to assess the levels and effectiveness of support currently provided to property owners we require information on the 'designation' status of your building, and the District in which you live.

Please mark as appropriate:

1. * In which administrative district is your historic property located?

Bromsgrove Malvern Hills Redditch Worcester City Wychavon Wyre Forest

2. * I am the owner and/or guardian of a building which is:

(see bottom-left text box for guidance)

Listed Building Situated within a Conservation Area Neither listed or within a Conservation Area Unknown

Optional: If you answered 'Unknown', we would greatly appreciate the provision of the first line of your address in order for us to identify the status of your property. This is not mandatory.

Section 2 of 3

This selection of questions aims to assess to what extent identify whether such changes are being discussed with the unrecorded modification, or that which has been undertaken by property owners and guardians in future.

We would therefore greatly appreciate your honesty in answering the following questions:

3. Has your property required some degree of remedial action?

If 'YES' - What was the level of damage? And in which area of the building?

*Please note we are only interested in damage to the building fabric.

Please mark when Significant

Impact to	Significant	Minor
Historic structural timbers	<input type="checkbox"/>	<input type="checkbox"/>
Historic masonry and brickwork	<input type="checkbox"/>	<input type="checkbox"/>
Historic interior furnishings and decor (including fireplaces, textiles, wall-painting)	<input type="checkbox"/>	<input type="checkbox"/>
Historic timber panelling and woodwork (e.g. floorboards, skirting boards, timber staircases, doors)	<input type="checkbox"/>	<input type="checkbox"/>
Historic 'services' infrastructure (e.g. plumbing & heating systems)	<input type="checkbox"/>	<input type="checkbox"/>
Historic render and plaster (e.g. lime-based plastering)	<input type="checkbox"/>	<input type="checkbox"/>
Historic metalwork (e.g. fixtures, locks & hinges, wall-ties)	<input type="checkbox"/>	<input type="checkbox"/>
Interior surfaces (e.g. excavation in advance of the reconstruction of ground stone floors; repair of under-floor timbers)	<input type="checkbox"/>	<input type="checkbox"/>
Exterior surfaces (e.g. for the provision of new infrastructure such as plumbing or pumping systems)	<input type="checkbox"/>	<input type="checkbox"/>
Structural foundations	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify): _____	<input type="checkbox"/>	<input type="checkbox"/>

Section 3 of 3

7. * Please mark the most appropriate option in response to the following questions:

English Heritage Guidance (left)
 Wychavon District Council Guidance (right)

8. * Have you consulted guidance on managing flood risk?

No
 Yes
 - please specify: _____

If you are unsure as to the status of your property information is available from:
 Listed Buildings: The National Heritage List for England - <http://en.english-heritage.org.uk/>
 Conservation Areas: Maps are available from the 'Conservation' webpages of your District Authority.

If you would like more information please contact:
 Worcestershire Archive and Archaeology Service
archaeology@worcestershire.gov.uk
 01905 760972

Or visit our project website: www.worcestershire.gov.uk/archaeology/flooding

ENGLISH HERITAGE
 worcestershire county council

Figure 1: Questionnaire to owners of historic buildings at risk from flooding. A full version of this survey can be located in the Appendix.



Figure 2: WAAS Community Archaeologist leading a guided walk in Kempsey, Malvern Hills

'Flood-walks'

Direct consultation with representatives of two active Flood Groups was organised in order to garner insights from those still directly engaged with flood risk management and response. The chosen groups were formed of advocates from the villages of Kempsey and Sedgeberrow. Both communities have been forced to respond to highly damaging flood events, and have established networks to promote local resilience.

A series of 'flood-walks' were undertaken, based loosely upon the 'walkpast' framework of community engagement established by Worcestershire Archive and Archaeology Service. Unlike standard guided walks, the events were designed to encourage a two way conversation, pressing for feedback on areas including local flood dynamics; where damage to buildings/sites is known about locally, and how they have sought to alleviate or repair it; the extent to which these works were supported by, and reported to appropriate heritage authorities; and the levels of awareness of key historic environment guidance documentation and sources of information. The fundamental aim was to understand in detail the impact of flooding on the community, and how they have responded to that impact. Further, how local advocates perceive both the heritage sector and local authorities more broadly; and

to what extent they have benefited or been hindered by engagement with such services.

The walks were planned to incorporate a cross-section of the local area's settlements, landscapes, and heritage assets: allowing discussion on a diverse range of topics from: repair or modification of historic buildings within the urban areas, to the assessment and maintenance of historic water-management features along local watercourses.

One-to-One Interviews

Numerous contacts were established with individuals through the questionnaires and 'flood-walks'. This facilitated one-to-one engagement with owners and advocates of various backgrounds, both through one-to-one interviews and through longer running discussions across the course of the project. The results of these discussions informed, and are outlined within, the analysis section of this report.

Statistical Analysis of the use of Key Guidance

Examination of statistics pertaining to the access of Historic England guidance through the HELM Guidance Library has been undertaken. Data representing unique online views of guidance documents during the 2012-13 and 2013-14

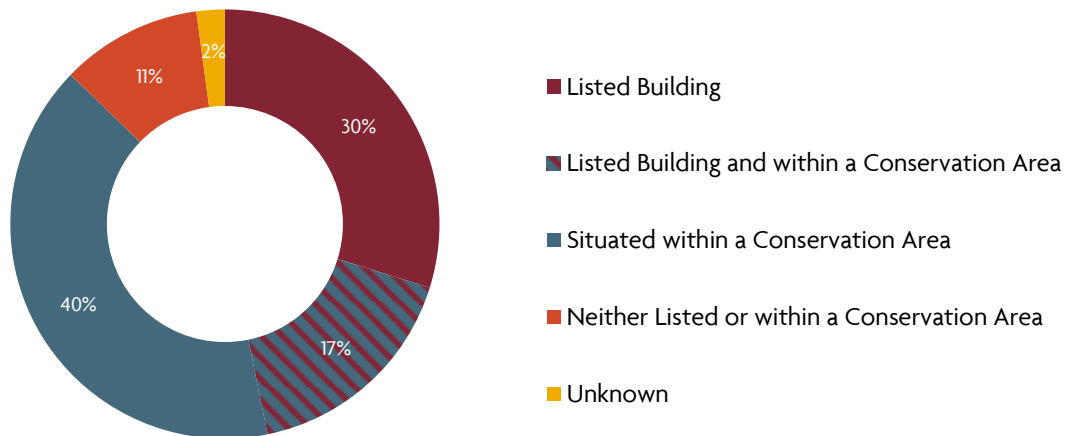


Figure 3: Proportion of those surveyed who owned a historic property with designated status:

financial years were provided by the Historic England Capacity Building Team. Basic statistical analysis facilitated insights into the extent of access to guidance pertaining to the historic environment and climate change, to establish any correlation or deviation from the results of the community consultation.

Results

Questionnaire

55 surveys were returned representing a response rate of approximately one-in-five of targeted properties. This was deemed sufficient to provide a representative sample for analysis. The following section outlines the key findings of the questionnaire. The full survey data and copies of all responses (with personal information removed) have been deposited within the project archive.

While a relatively even number of surveys were returned from each district, there was a notable variance in the proportions returned relative to the number of surveys originally distributed. **The communities of small towns**

and villages responded particularly well to the survey, and were generally keen to engage further with the project. Engagement from Tenbury Wells, the largest of the survey areas, was disappointing; however this may be a consequence of a higher proportion of rented properties, which may have hindered delivery of the questionnaire to the owners of the buildings at risk.

Almost half of those who responded occupied a listed building, with a sizeable proportion of other respondents living in unlisted buildings within a Conservation Area. A smaller number of respondents occupied historic buildings which were afforded no statutory protection, while a

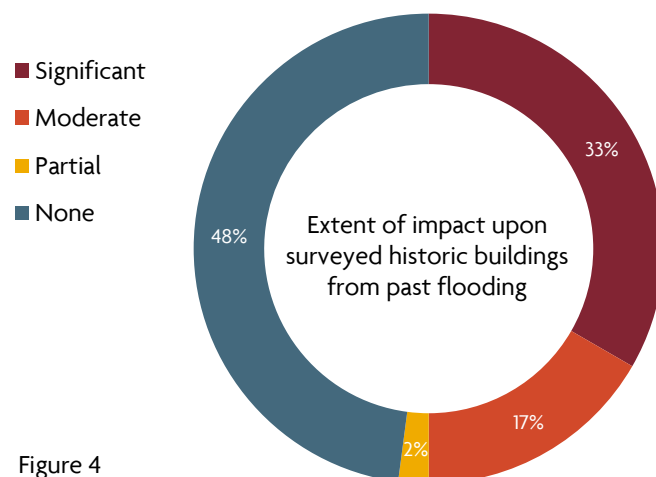
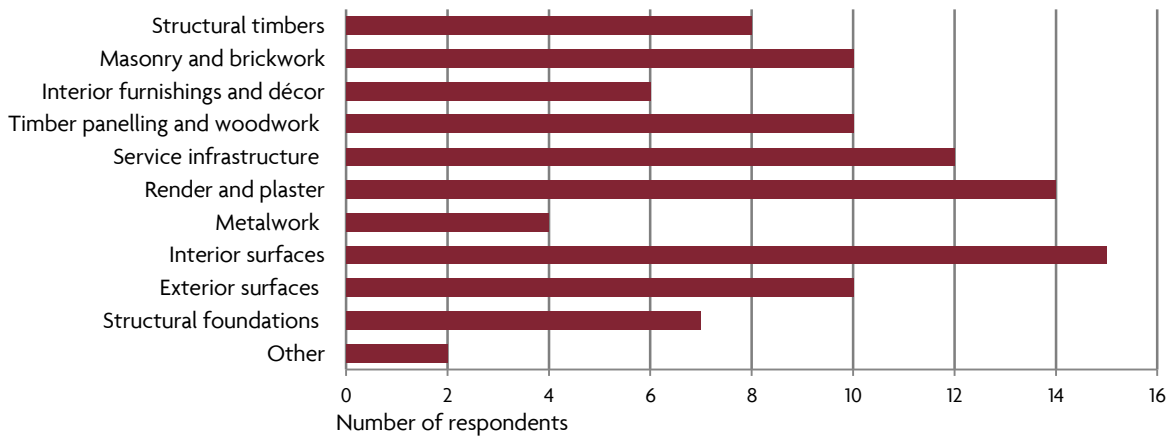


Figure 4

Figure 5: Form of the removal, restoration and/or reconstruction of historic structural fabric in response to flood damage



single respondent was unaware of their property's status.

Just over half the historic properties surveyed had required some degree of restoration or reconstruction as a result of flood damage to elements such as historic structural materials or infrastructure. Over 60% of those consulted have also taken action to mitigate for the impact of potential flooding.

The most commonly stated impacts of flooding on the buildings in question were upon historic interior surfaces incorporating damage to historic floor-surfaces, floor-timbers and walls. This was closely followed by damage to historic

infrastructure such as plumbing or drainage systems. While damage to structural timbers has been recorded in only eight occurrences, this is likely biased by the predominantly 18th to 19th century brick-built character of the areas surveyed.

Measures to alleviate the impacts of flooding through mitigation measures were dominated by the installation of infrastructure to facilitate the erection of temporary flood barriers when required. The installation of bespoke pumping systems is also common, often replacing the historic drainage systems, alongside general maintenance to secure property resilience.

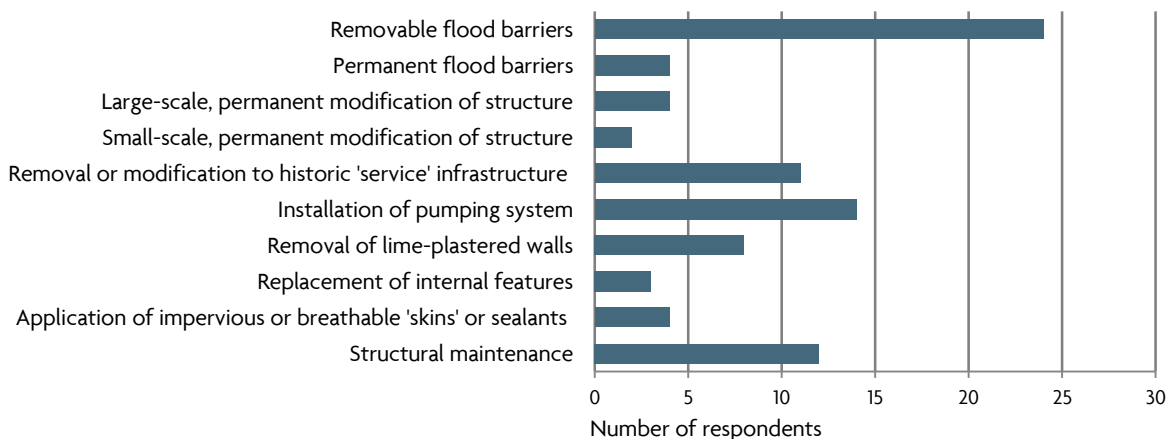
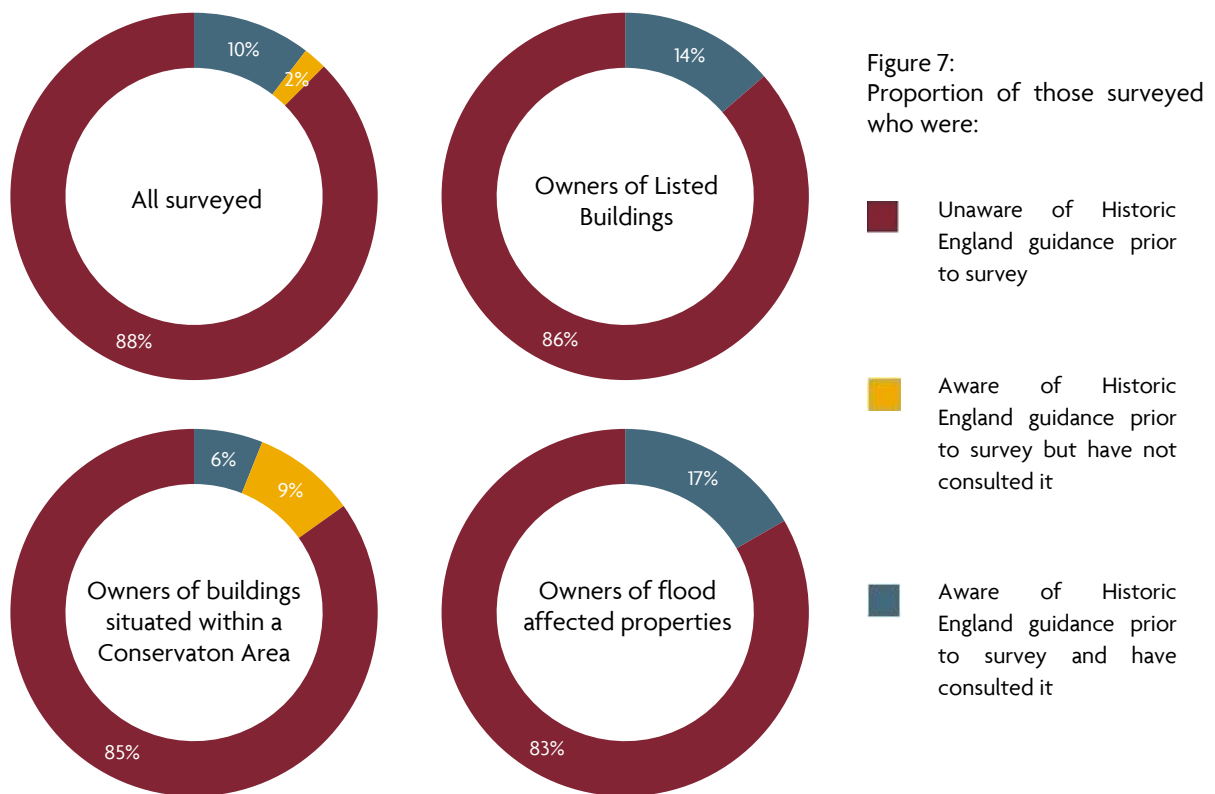


Figure 6: Form of adaptations and modifications to historic buildings to improve structural protection and resilience from flooding



The survey has identified a substantial lack of awareness of available guidance on flooding and historic buildings within communities at risk of flooding. Of all those surveyed, only five had consulted the Historic England *'Flooding and Historic Buildings'* guidance, while the remainder had no prior knowledge of its existence, constituting 88% of those surveyed. The same lack of awareness was also evident with regards to local guidance created by Wychavon District Council, and disseminated across the county in response to the major flooding events of 2007.

Significantly, statistics remain broadly consistent when considering the responses of both those who occupy listed buildings or that are situated

within a Conservation Area, to those with no statutory protection.

The opportunity to provide additional comments was taken by a number of respondents. Many of these comments pertained to local issues of existing or proposed measures of flood risk management, with several comments in response to perceived negative impacts of the Environment Agency's proposed 'Property Level Resilience' scheme. Other areas of comment included: issues surrounding the actions or inactions of landlords to protect and maintain tenanted 'at risk' properties; problems faced in securing insurance cover or pay-outs; and concern over a perceived variability in attitudes across local authority services (hindering mitigation strategies and community support).

The perception of what constitutes a 'historic' structure was raised on numerous occasions, with owners stating they had not considered their home to be so up until this point. This included a number of properties over 200 years old, and situated within Conservation Areas.

"Our property is around 150-170 years old... It is situated within the Conservation Area which covers much older and more 'significant' buildings. We have not really considered or been encouraged to consider it as 'historic', but this should probably be reconsidered."

Resident of Kempsey, Malvern Hills

A number of anonymous comments stated concerns regarding the reporting of changes or repair that they had been forced to undertake – fearing reprisals from government authorities. Respondents feared that engaging heritage organisations or agencies with the process, particularly during and immediately after flood events, would hinder their ability to rapidly and cost-effectively repair and alleviate damage. The danger of ill-informed change to the heritage assets is well established, as discussed elsewhere in the section; however, perhaps more concerning is the possibility that public perceptions of the roles of heritage specialists may be precluding consultation. The notion that heritage specialists will further complicate and/or hinder what are often urgent measures to repair and restore property is unlikely to facilitate proactive engagement.

There is also lack of awareness of the legal position with regard to Listed Buildings. It is a criminal offence to carry out works to a Listed building without LBC (where it is required). Much of the work described may not have needed LBC, but some clearly should have gone

through the consent process, and most would have benefited from professional advice.

The issue is unfortunately hard to fully quantify, and will likely vary from area to area. However, there may be a pressing need to not only re-advertise key guidance and to reaffirm the legal position; but also to promote the value of support from local authority and statutory agency heritage services; and to encourage local authority officers to be more proactive in building relationships and capacity within at risk communities. The current, and substantial, budget cuts to local authorities will hinder the ability for heritage professionals to be more proactive, but clearly there is a significant need for this to occur.

A number of those consulted stated their professions to be within areas pertaining to mitigating for flood damage or risk, including engineers and building contractors. Alongside providing comments on technical and fiscal facets, these individuals stated **strong concerns that they were not aware of the Historic England guidance despite their direct professional engagement with the protection, reconstruction and restoration of historic buildings in response to flooding.**

"... I was unaware of these guidance documents. Having seen some very bad flood repairs (and poor advice from loss adjusters) to flood victims who own historic properties, [I believe] these guidance documents should be emailed to all builders".

Building Contractor and resident of Childswickham, Wychavon

Key Issues: Questionnaire

- Awareness of key guidance on the modification, reconstruction and restoration of historic buildings in response to flood risk or damage is strikingly low amongst the target audience.
- While not fully quantified, awareness of such guidance within professions directly engaged with mitigation, restoration or reconstruction of historic assets may be equally poor.
- The perception of what may be deemed an 'historic' structure is variable. Owners of at risk historic buildings may not therefore be seeking advice from heritage agencies and/or organisations during processes of modifying or restoring their property.
- Substantial changes to designated historic buildings in response to flood risk and/or damage are not always reported to the appropriate authorities. This is due to a lack of awareness of statutory obligations, alongside fear that reporting such changes may result in the emergence of additional time and cost.
- The higher proportion of tenanted buildings within town centres may be resulting in less considered and active maintenance of structural assets in large urban areas than in villages where owner-occupiers are more prevalent.

'Flood-walks'

The 'Flood-walks' with representatives of local 'Flood Groups' proved highly conducive towards garnering insights on both the actual and perceived roles of historic environment organisations within frameworks of flood risk management and response.

The Flood Groups had not collectively engaged with heritage professionals or organisations as a single entity prior to this project; although, a number of members had direct contact with Conservation Officers in respect of their individual needs. The groups were keen to rectify this, requesting future representation from local authority historic environment services upon their local and catchment-area steering groups.

The reasoning for this lack of engagement stemmed from a perception that historic environment professionals or organisations were not potential sources of advice, support, or information when considering local flood risk management. This has precluded consultation on measures of local resilience, protection, or repair with such bodies; thus, local groups have never considered seeking advice or locating pertinent guidance documentation.

For instance, while there was a clear awareness of the potential and influence of historic water management features, such as culverts, on local hydrology; these had not been seen as elements of Sedgeberrow's historic environment until the professional engagement facilitated by this project. Thus, while regular recording and monitoring of features along local watercourses occurs - often indirectly examining the form and condition of historic structures or archaeological materials (such as earthworks, or deposits eroding from riverbanks) - it had not occurred to the groups to liaise with the local Historic Environment Record. The added potential to promote the preservation or enhancement of such features as both key elements of local flood management *and* local heritage assets was therefore not recognised. The Flood Group has however expressed a strong desire to resurvey the watercourses to record associated historic environment features and their conditions. This will be facilitated by the Worcestershire Archive and Archaeology Service.

A common frustration raised by the groups surrounded the highly variable productivity of engagement with local authorities depending on the organisation or service in question. For instance, while the Flood Risk Management team

Key Issues: 'Flood-walks'

- Awareness of the potential contribution of historic environment practitioners towards informing flood risk management and restoration within community Flood Groups is low. Pertinent guidance and advice is therefore not being widely sought.
- Poor internal communications between local authority services, and between various statutory agencies, is hindering the actions of local Flood Groups through fragmentation of resources and efforts.
- Activities to support local flood resilience and advocacy in rural areas, such as the monitoring and recording of water management features, are inherently engaging with historic-structural or archaeological materials. The potential benefits of consulting local Historic Environment Records in advance of such endeavours, or the potential to enhance the HER consequent to the surveys, are however being overlooked.

of Worcestershire County Council were praised for the form and nature of their service; another of the Council's services was subject to substantial criticisms. The primary complaint was that a lack of communication between the various services and agencies operating within their respective areas is resulting in a highly fragmented approach to flood risk management; thus hindering community efforts to inform and support measures of alleviation and repair for their locality.

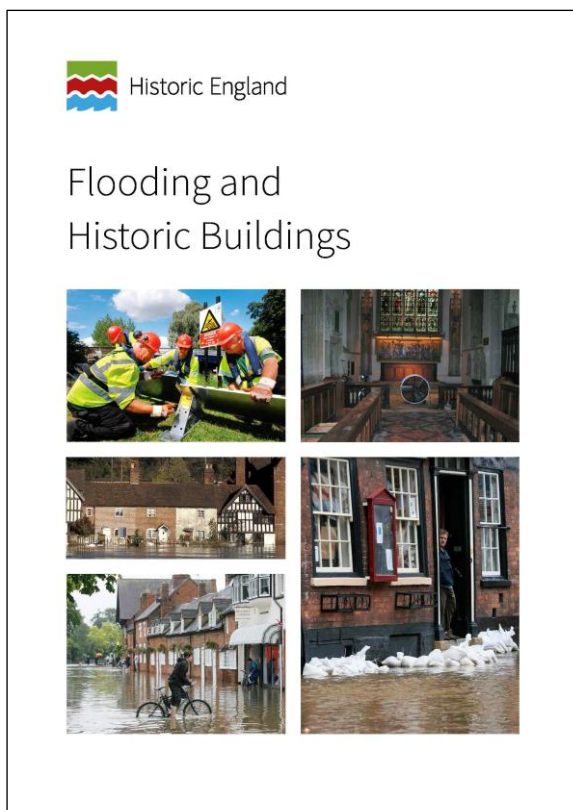


Figure 8: Historic England guidance 'Flooding and Historic Buildings'

Finally, discussions highlighted a number of future opportunities through which local flood groups could engage with heritage organisations. Prominent among these is the possibility for local Archive and Records Office services to support Flood Groups through searches for, and provision of pertinent historic documentary materials such as historic 'Land Drainage Board' mapping of now abandoned agricultural drainage systems. Again, Worcestershire Archive and Archaeology Service is looking to facilitate such collaboration in future.

Statistical Analysis of the use of Key Guidance

In contrast to the results of the questionnaire and flood-walks, examination of statistics of online views of Historic England HELM guidance pertaining to climate change has not indicated such a lack of usage. Figures from the [HELM Guidance Library](#) display that guidance surrounding the modification of historic buildings for objectives including increased energy efficiency, energy creation, and protection from environmental threats is above-average or high respective of other documentation (see figure 9).

The statistics therefore display an active audience for guidance relating to flood risk. Further, the proportion of use of the *'Energy Efficiency and Historic Buildings'* suite of documents is striking – with just over 18% of all unique views relating to this series. **This suggests that structural modifications in response to climate change and environmental risk are among the most significant current forces for change to historic buildings.**

Figure 9: Statistics of use of selected documents from the Historic England HELM Guidance Library between April 2013 and March 2014.

Guidance	Unique views	% of all views	Rank (of 418)
Flooding and Historic Buildings	873	0.55%	48th
Climate Change and the Historic Environment	629	0.40%	69th
Energy Efficiency and Historic Buildings: Insulating solid walls	4818	3.05%	2nd
Energy Efficiency and Historic Buildings: Insulation of suspended timber floors	4064	2.57%	3rd
Energy Efficiency and Historic Buildings: Secondary glazing for windows	3326	2.10%	8th
Small Scale Solar Electric (Photovoltaics) Energy and Traditional Buildings	695	0.44%	59th
Micro Wind Generation and Traditional Buildings	241	0.15%	156th

Key Issues: Statistical Analysis of the use of Key Guidance

- There is a marked disparity between awareness of key guidance pertaining to environmental risk and climate change amongst home owners and community flood groups, and its implied usage indicated by statistical analysis of online views. This may indicate historic environmental information and advice is not permeating beyond heritage practitioners to other key stakeholders.

Analysis

Guidance and Awareness

All aspects of community engagement throughout this project have showed that there is a lack of awareness of the form and availability of both literary and professional guidance on restoring and protecting heritage assets in respect of flooding.

Use of flagship guidance from Historic England on the modification, reconstruction and restoration of historic buildings in response to flood risk or damage is low amongst community advocates and property owners. While a lack of marketing of this 'product' must have contributed to low usage of existing guidance, the frameworks through which to promote the guidance are well-established through Historic England's website.

The analysis of statistics pertaining to online views of HELM guidance on climate change does not however indicate a total lack of usage. It appears likely that such guidance is therefore not permeating beyond the historic environment sector, towards the broad range of environmental and economic stakeholders.

Existing documentary guidance from Historic England is therefore, at present, largely unused in supporting home owners in the protection and/or repair of historic structural assets. This may also be true in respect of contractors engaged with flood repair and protection; though this has not been fully quantified.

The current scope and mechanisms of disseminating such documentation remains highly unsuitable in respect of flood events: with total reliance upon access via an internet connection, often lost with disconnection of electricity during a flood event; thus largely negating accessibility to pertinent advice when it is most needed.

There is however a more fundamental issue to be considered: that current perceptions of the roles of historic environment and heritage practitioners within many communities do not facilitate consultation during planning for flood risk management or response.

Perceptions of what may be deemed an historic or archaeological asset is highly variable. Many responses indicated that a lack of formal recognition for structural assets through statutory designation often precluded their consideration of heritage agencies and/or organisations during processes of modification and/or repair. Further, the benefits of engaging with archaeologists (as highlighted within this project's discussion of flood alleviation schemes) is often overlooked. Historic environment expertise is therefore rarely sought by individuals or local flood groups, as they do not perceive substantial value in it; thus, limiting engagement to that of reactive measures during consultation on proposed alleviation schemes, or during flood events.

This lack of engagement and awareness will inevitably result in poorly informed works. Ill-informed decisions by non-expert parties on when and if to modify properties; how this is best achieved in response to the historic structural fabric; and what distinct opportunities and constraints are presented by varying historic architectural characteristics, will inevitably prove highly detrimental to structural resilience and long-term conservation. The sensitivities and complexities of adapting and repairing historic buildings in response to flood events are well established between heritage professionals, yet this capacity is often under-used.

Impact on the Historic Environment

A combination of lack of awareness, lack of specialist advice and support, and a poor understanding of the detrimental effects of the wrong measures is leading to a significant impact on the historic environment. This includes both, substantial and long term impacts on important

buildings, and low level changes to many individual buildings and archaeological features that have a significant overall impact on the special character of a local area.

The danger of ill-informed change to the historic integrity and future sustainability of structural assets is well established, and we found numerous examples throughout the project where such changes had occurred. The survey results show that half of all historic property owners had carried some degree of restoration or reconstruction. Given that most owners will have been in their properties less than 20 years, this is a significant number.

The case studies demonstrate the level of damage incurred during flood events and the surveys show that limited specialist or local authority input has helped in the necessary repairs. What is less easy to quantify, therefore is the quality of these repairs and whether they are appropriate to building and sympathetic to its character. Much of it may be of high quality, and it may be that our attention was directed towards those repairs that fell short.

If we are to build resilience in the future, we need to ensure that communities and individuals have access to the right help and support, and that builders/contractors have the necessary skills to carry out the work. All the documentation, research and understanding exists: Historic England has done a lot of research and produced much guidance; heritage projects to upskill in traditional restoration techniques are being funded through various projects, e.g. the HLF funded Weaver's Cottages project in Kidderminster <http://www.weaverscottages.info/> or a number of projects run at Avoncroft in Bromsgrove www.avoncroft.org.uk. It is the dissemination of this knowledge that is lacking and the right support/advice at the right time.

Communication

Levels of communication between local authorities, statutory agencies, and community advocacy groups engaged with heritage management in respect of flooding require improvement to facilitate greater exchanges of information and advice.

The need to inform the relevant authorities of the impacts of flood events, remedial actions taken, or means of constructive mitigation does not appear to be readily apparent to many owners of at risk designated assets. The surveys have highlighted examples where either appropriate consents have not been acquired, or where there is clear confusion over the property-owner's responsibilities and obligations as curators of listed buildings or scheduled monuments. The legal position is clear and owners need to be fully aware of their obligations. Ignorance is no defence for failing to obtain the relevant consent.

Engagement with historic environment services of local authorities and statutory agencies may be further limited by a sense of fatigue within communities towards issues of flooding in their local area. The community's need to pursue and assimilate a broad range of guidance and knowledge is extensive, facilitating engagement and consultation with an equally broad array of stakeholders. It is therefore essential that future engagement by historic environment practitioners is 'opportunities-led', and does not simply result in the allocation of further constraint.

Poor internal communication within local authorities can act as further hindrance to a community group's desire to engage with heritage services. Variable levels of engagement and support alongside contrasting advice engenders deep frustrations; thus, hindering efforts by historic environment services to become embedded within existing frameworks.

Critically, these issues of communication are restricting access, dissemination, and reporting of information pertaining to the management

and change of numerous heritage assets, with serious consequence. The low levels of reporting of redevelopment of both designated and undesignated heritage assets, to relevant services or authorities, in response to flooding or flood-risk is such a repercussion. As shown, necessary repairs consequent to flood damage can be substantial, often incorporating significant restoration of historic fabric or earthworks through invasive techniques, and in manners not readily apparent without expert inspection. Further, efforts to mitigate the impact of flood events within properties can result in the loss of distinctive architectural and archaeological facets of the site. The ability of heritage agencies, services and authorities to manage and inform such change is minimised through poor communications; and opportunities to garner insights into the past from architectural or archaeological interventions are being regularly lost. Such issues are only set to be compounded by the substantial reductions in capacity of statutory agencies and local authorities through measures of governmental austerity. Developing a new, efficient mechanism of reporting change will therefore be essential.

Capacity

While the extensive loss of capacity across the large majority of historic environment service and authorities is a factor in poor levels of communications and provision of advice, many of the issues highlighted appear to have been prevalent prior to this period of governmental austerity. Therefore, diminished capacity cannot be advocated as the pivotal factor in the issues outlined within this report. The ability to rectify such concerns will however be substantially hindered by reductions in numbers of local authority heritage specialists, particularly Conservation Officers. It will therefore be essential to develop mechanisms to deliver advice and acquire information that do not rely exclusively on historic environment professionals.

Building additional capacity within non-heritage specialists to recognise issues and opportunities pertaining to the historic environment will be essential. Communities at risk from flooding are amongst interest groups most engaged by statutory agencies and local authorities due to the perpetual nature of the threat; however, as already mentioned these are largely from specialisms outside of the heritage sector. Ensuring such individuals or organisations are able to at least liaise effectively with property owners in respect of heritage matters, thus facilitating greater engagement with those of the historic environment sector, is a priority. **Working in partnership with agencies, authorities, and communities is likely the only viable option for this requisite expansion of historic environmental capacities while facing current budgetary reductions.**

Opportunities

While the consultation of communities was predominantly aimed at identifying key historic environmental issues facing at risk communities, a number of opportunities have been highlighted through consultation of exemplar advocacy groups. The extent and regularity of community-led appraisals of landscape and structural features pertaining to local hydrology and water-management was notable within active Flood Groups. There is therefore opportunity to build capacity into such frameworks to facilitate greater examination and condition-assessment of historic environment assets, and avenues to develop such approaches should be explored. A viable option may see local Historic Environment Records facilitating training and collation of information, with funding from the Historic England Regional Capacity Budget.

Engagement with local flood groups has also facilitated the creation of new working relationship between WAAS, community advocates, and a range of cross-disciplinary professional bodies already established within flooding-support frameworks. These new

connections will be fostered by WAAS beyond this project to engender a greater level of representation of historic environmental assets when planning for flood risk and response; alongside improved resilience within Worcestershire's at risk communities through provision of additional specialist advice.

Rectifying many of the aforementioned issues will also invariably result in a highly favourable outcome for the historic environment and practitioners engaged in its management:

The statistics pertaining to awareness and use of key Historic England guidance are undisputedly discouraging; however, the desire to make use of such documentation was almost universally positive once they had been highlighted to the target audience.

While erroneous perceptions of the roles and potential contribution of heritage practitioners is a concern, engagement of community groups by WAAS easily fostered new and mutually-beneficial practices.

Finally, by addressing such issues of access, awareness, and communications between stakeholders, many of the issues pertaining to the reporting and management of change to historic environmental assets should be realigned – resulting in a greatly enhanced capacity to develop the historic environment evidence base and provide valuable advice to those who require assistance.

Fundamentally, while serious concerns have been highlighted by this project, all are rectifiable with a modicum of well-informed investment.

CASE STUDY

The Isbourne Catchment Group

The 'Sedgeberrow Flood Group'¹ was established following the devastating floods of 2007. The group works to increase local resilience to flooding through: the development of robust, co-ordinated strategies in collaboration with relevant authorities; improving infrastructure, services, and community support networks; providing guidance for self-help; and most pertinently undertaking regular assessments of local watercourses and water-management features, much of which incorporates historic and archaeological features.

The 'Sedgeberrow Flood Group exemplifies the potential of community driven action and coordination in response to flood risk and events. This has been achieved without major financial capacity, and with highly variable levels of support from local authority services and statutory agencies. It was however recognised by the group that the parish is fortunate to be well resourced in terms of local personnel, expertise and enthusiasm, contrasting markedly to their counterparts along the River Isbourne and its tributaries. A wider reaching means of community-led advocacy is therefore being formed in the Isbourne Catchment Group (ICG).

The ICG is a recently formed community group focused upon the catchment of the River Isbourne between its source and the River Avon at Evesham. The catchment based approach is a deliberate attempt to avoid the artificial administrative boundaries not recognised by the watercourse such as parish or county boundaries. Membership of the group has therefore been drawn from parishes across both Worcestershire and Gloucestershire, and reflects interests arising from the devastating floods of 2007, and on-going flood risks. The ICG aims to minimise both the frequency and severity of flooding along the catchment into the future, whilst also recognising the importance of land management, water quality, and the wider historic and natural environment.

The group has enlisted the support of the Environment Agency, the University of Gloucestershire and the Gloucestershire Farming & Wildlife Group (FWAG), and recognises that support from a broad host of statutory agencies and local authority services will be essential in order to obtain the necessary guidance and advice to unlock diverse sources of funding. The project has facilitated Worcestershire Archive and Archaeology Service's engagement with the group, with WAAS committing to henceforth provide guidance and support in issues of both environmental practice and policy.

¹ <http://www.sedgeberrow.com/floodgroup/flood-group.html>

CASE STUDY

The Wribbenhall and Bewdley Defences

Wribbenhall is a small settlement on the eastern side of the River Severn within the town of Bewdley. It features a particularly high density of historic buildings, many of which are situated within the flood zone. The area is highly susceptible to flood events, with substantial impact to local heritage assets, and their occupants, recorded from high river levels, rising groundwater, and surface water flooding. Following the floods of 2000, the Environment Agency has installed temporary barriers along the river edge during flood events.

Following the 2008 Pitt Review (Pitt, 2007) - which recommended national policy for temporary defences to be considered as only short term measures - a 2014 cost-benefit analysis of the Bewdley/Wribbenhall defences (Environment Agency, 2014) concluded that continuation with the 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 protection 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 temporary barrier erection because they are not seen as a sustainable solution.

Local residents have some concerns over this approach. The community has experienced decades worth of flood protection and resilience measures (including earlier PLR based approaches), with generally low levels of success. The temporary barriers along the river are, however, viewed to have provided an effective and consistent respite, and are therefore highly valued by occupants of at risk properties. Those who have invested considerable time, money and effort into conserving Wribbenhall's unique character and buildings state strong reluctance to forfeit this protection for a scheme driven primarily by criteria of cost-effectiveness. They see the Environment Agency's approach as overly focused on fiscal solutions, above the needs of the Wribbenhall community.

The need for any Property Level Resilience measures to be sensitive 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 discussions over the future of flood risk management in Wribbenhall foreshadows a key issue facing the heritage sector in the coming years - how to strike a balance between the protection of significant heritage assets; the support of at risk communities within historic settlements; and increasing pressures upon statutory agencies to prioritise flood risk management by predominantly fiscal criteria. The debate may therefore form a key turning point as to how heritage assets are managed in respect of flood risk in the immediate future. The resolution of these concerns can only be achieved through proactive collaboration between the Environment Agency and other heritage professionals.

Recommendations

The following five recommendations are made to Historic England based upon the range of issues and opportunities highlighted through this study:

1. **Instigate a marketing initiative to ensure the target audience of the *'Flooding and Historic Buildings'* guidance, and other information and advice on the HE website, are aware of their existence and utilise resources and historic environmental expertise accordingly.**
2. **Commission a survey of contractors engaged with issue of repair and/or modification of historic properties in response to flooding to formally quantify their awareness and use of historic environmental advice and guidance.**
3. **Develop and commission a programme of Historic England 'HELM' training events for both heritage and non-heritage practitioners on engaging with, supporting, and building capacity within communities occupying historic settlements at risk from flooding.**
4. **Explore new, and promote existing mechanisms of reporting change to historic or archaeological assets as a result of flood damage or mitigation.**
5. **Commission pilot studies through National or Regional Capacity Budgets to develop methodologies of community-led historic environmental assessment to be undertaken by local Flood Groups during appraisal of water-management and/or at risk features within their respective localities.**

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Appendix: Questionnaire for owners of historic buildings at risk from flooding

(NB. At the time of the survey, the split within English Heritage had not yet occurred. References to English Heritage below now refer to the part of the organisation renamed Historic England)

Assessing the Impact of Flooding on Heritage Assets and the Historic Environment

Worcestershire Archive and Archaeology Service & English Heritage

This survey can also be completed online at:
<https://www.surveymonkey.com/s/L7LWDQX>

Through this survey, we are aiming to assess how effectively heritage organisations and services are supporting the adaption and reconstruction of your historic building in response to flood risk and damage.

This survey is divided into three short sections, and should take on average **no more than 10 - 15 minutes to complete**. Each section is preceded by introductory text providing the context for the questioning.

This survey can be undertaken fully anonymously, with the provision of personal data entirely optional. Any information that is provided will be securely disposed of at the close of the project. No information will be shared with any third party organisations.

NB . We would greatly appreciate any questions marked with a * to be completed by all of those surveyed.

Section 1 of 3

In order to assess the levels and effectiveness of support currently provided to property owners we require information on the 'designation' status of your building, and the District in which you live.

Please mark as appropriate:

1. * In which administrative district is your historic property located?

Bromsgrove Malvern Hills Redditch Worcester City Wychavon Wyre Forest

2. * I am the owner and/or guardian of a building which is :

(see bottom-left text box for guidance)

Listed Building Situated within a Conservation Area Neither listed or within a Conservation Area Unknown

Optional: If you answered 'Unknown', we would greatly appreciate the provision of the first line of your address in order for us to identify the status of your property. This is **not** mandatory.

If you are unsure as to the status of your property information is available from:
 Listed Buildings -
 The National Heritage List for England - <http://list.english-heritage.org.uk/>
 Conservation Areas -
 Maps are available from the 'Conservation' webpages of your District Authority

If you would like more information please contact:
Worcestershire Archive and Archaeology Service
archaeology@worcestershire.gov.uk
 01905 765972

Or visit our project website: www.worcestershire.gov.uk/archaeology/flooding



Section 2 of 3

This selection of questions aims to assess to what extent historic buildings are being adapted or modified in response to flood risk, and in what manner. Further, we are seeking to identify whether such changes are being discussed with the appropriate heritage professionals and organisations. **We are NOT seeking to 'catch out' those who may have undertaken unrecorded modification, or that which has been undertaken without appropriate consent.** Instead, we are aiming to assess how we can better support and engage with historic property owners and guardians in future.

We would therefore greatly appreciate your honesty in answering the following:

3. Has your property required some degree of removal, restoration and/or reconstruction of historic fabric in response to damage from flooding?

If 'NO' - Please continue to the next question

If 'YES' - What was the level of damage? And what action did you take? (Please see the text-box at the top of the following page for guidance on terminology)

Please note we are defining 'historic' as any structure or feature (whether original or not) dating to before 1925

	Impact from Flooding?			Consequent Action?			
	Please mark where applicable to you:			Please mark one option for each 'Impact' you have highlighted:			
	Significant	Moderate	Partial	Complete removal/excavation without replacement	Complete removal/excavation with modern replacement	Restoration	Reconstruction
Historic structural timbers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Historic masonry and brickwork	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Historic interior furnishings and decor (including fireplaces, textiles, wall-paintings)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Historic timber panelling and woodwork (e.g. floorboards, skirting boards, timber staircases, doors)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Historic 'service' infrastructure (e.g. plumbing & heating systems)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Historic render and plaster (e.g. lime-based plastering)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Historic metalwork (e.g. fixtures, locks & hinges, wall-ties)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interior surfaces (e.g. excavation in advance of the reconstruction of ground storey floors, repair of under-floor timbers)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exterior surfaces (e.g. for the provision of new infrastructure such as plumbing or pumping systems)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Structural foundations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify):	_____						

Section 2 of 3 (continued)

'Replacement'	Replacing the fabric of a structure or feature to a new, renovated state by the total removal of historic materials or items, preceding the introduction of a modern equivalent.
'Restoration'	Returning the existing fabric of a structure or feature to its historic state by removing damage from original materials or by reassembling existing components WITHOUT the introduction of new materials.
'Reconstruction'	Returning a structure or feature to an historic state, distinguished from restoration by the introduction of new materials and/or components into the fabric, while retaining the historic form and context.

4. Have you adapted or modified your property to improve its protection and resilience from flooding?

If 'NO' - Please continue to the next question
 If 'YES' - In what manner? (Please mark the appropriate boxes)

- | | | |
|---|---|--|
| <input type="checkbox"/> Installation of removable flood barriers (e.g. slots for interlocking boards over windows; airbrick covers; temporary door guards) | <input type="checkbox"/> Small-scale, permanent modification of structure (e.g. raised front door-steps) | <input type="checkbox"/> Installation of pumping system for the removal of flood-water |
| <input type="checkbox"/> Installation of permanent flood barriers (e.g. fixed flood gates; replacement watertight doorways (external), 'bunding') | <input type="checkbox"/> Structural maintenance (e.g. repointing of masonry) | <input type="checkbox"/> Removal of lime-plastered walls or replacement with modern plastering |
| <input type="checkbox"/> Large-scale, permanent modification of structure (e.g. heightening of floor levels; replacement of timber-suspended floors) | <input type="checkbox"/> Removal or modification to historic 'service' infrastructure (e.g. reconstruction of heating systems; installation of new electrical circuitry; installation of flood-resistant plumbing system) | <input type="checkbox"/> Replacement of historic internal features (e.g. doors, doorways, fireplace) |
| | | <input type="checkbox"/> Application of impervious 'skins' or sealants to building materials |
- Other (please specify): _____

Please skip the following two questions if you answered NEITHER Questions 3 or 4

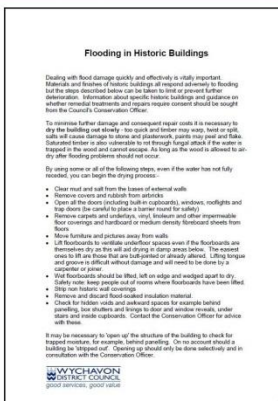
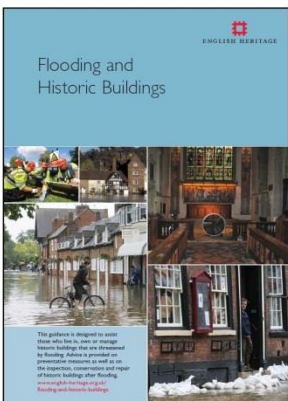
5. Did any of the activities outlined in question 3 or 4 require some form of planning consent (e.g. Listed Building Consent)? (Please mark one box)

- Yes, and it was obtained
 Yes, and it was not obtained
 No
 Uncertain

6. Did you inform any of the following of the form and extent of alterations made to your property?: (Please mark as appropriate)

- Local Authority Conservation Officer
 Worcestershire Historic Environment Record
 English Heritage
 None of the above
 Other (e.g. Local Authority planning officers). Please specify: _____

Section 3 of 3



These images display two guidance documents which provide information to owners of historic buildings on dealing with flooding.

The guidance has been produced by English Heritage (left) and Wychavon District Council (right).

The latter was produced in response to the Summer 2007 floods, and is linked to by a number of Worcestershire's District Council websites.

The following questions aim to assess to what extent such documents are both known-of and utilised, to find out how effectively we are getting this information to those who need it. We would therefore greatly appreciate your honesty in answering the following:

7. * Please mark the most appropriate option in reference to the guidance documents:

	'Prior to this survey I was not aware of this document'	'I am aware of this document but have not consulted it'	'I have consulted this document'
English Heritage Guidance (left)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wychavon District Council Guidance (right)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. * Have you consulted guidance on managing flooding in respect of historic buildings in addition to those detailed above?

- No
 Yes
 - please specify : _____

Thank you for completing the survey

To return the survey you can:

- Deliver the completed survey to your local collection point (outlined within the enclosed cover-letter)
- Scan the survey and email to archaeology@worcestershire.gov.uk with title "FLOOD Project Survey"
- Send the survey via post to:

'FLOOD' Project Team
Historic Environment Record
Archive and Archaeology Service
The Hive
Sawmill Walk
Worcester
WRI 3PD

If you have any questions, would like more information, or have any additional comments please visit
www.worcestershire.gov.uk/archaeology/flooding
or contact
archaeology@worcestershire.gov.uk
01905 765 972

Optional

We are keen to speak to property owners in more detail in regards to challenges they have faced when adapting or restoring historic buildings due to flooding. This may include issues arising when restoring the historic fabric of your property, or your engagement with insurers, loss adjustors, contractors, local authorities or statutory agencies.

If you would be willing to discuss your circumstances with us, please provide your name and preferred method(s) of contact :

Name: _____

Address: _____

Post Code: _____

Email Address _____

Phone Number _____

Additional Comments:

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A digital copy of this document and the associated project report is available from the Worcestershire Archive and Archaeology Service Online Archaeology Library.

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www.historicengland.org.uk

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