RICS
Building Conservation Journal

OPINION

In harmony

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Cultural heritage is hard to categorise neatly. A building may have an historic interior, but heritage may also lie buried underneath it or in the surrounding landscape as archaeology.

Among the members of the Institute of Conservation (Icon) are conservators who cover all aspects of heritage. Conservators and conservation surveyors need to share an understanding of conservation philosophy and the standards that are distinctive to each profession's practice.

With better understanding, we can make informed, competent decisions, working effectively while educating clients and public about the value of what we do.

Standard definition

One particular complexity is what defines a "heritage professional" when this covers conservators, surveyors, archaeologists, architects, engineers and conservation officers. To enable mutual understanding, Historic England recently commissioned a comparison of accreditation and membership schemes for UK heritage professions.

Although not yet publicly available, its table of comparison will form the basis for defining what constitutes a "suitably qualified professional". Heritage bodies will then be able to promote each other's accreditation and professional standards.

After many years of work by professional bodies and key clients to harmonise accreditation in the sector, there is a great deal of commonality between our schemes. However, this is not evident to our client groups: at least, that is the message from recent research commissioned by the Historic Environment Forum of England, which sought a better understanding of how the "qualified heritage professional" is perceived.

The research is due to be published this spring, but we know from interim reports that we have much to do to make it easier to access information, convince clients of the value of commissioning an appropriately qualified person, and demystify the different heritage sector accreditation schemes.

Such collaborative efforts are essential if the heritage sector is to respond to the challenges that lie ahead.

Creating links

One such challenge is the planned increase in major infrastructure projects in the UK. More than 40 schemes are planned up to 2033, at an estimated total capital cost of £464.9bn.

There will also be a need to fill skills gaps – with an estimated capacity shortfall of 880–1,900 full-time staff per year from 2016 to 2020 in the archaeological sector alone, for instance.

The £7bn refurbishment of the Houses of Parliament is due to start in 2020 and will also require qualified professionals and trainees, as will the £379m refit of Buckingham Palace.

All these projects offer major opportunities to advocate our professional standards, offer new routes into the sector through training and higher education, and recruit and retain appropriately qualified professionals.

Collaboration will enable significant benefits. Relative newcomers such as Icon can learn from more established bodies such as RICS. As we face unprecedented demands, our voices can together influence the market to meet the highest standards of heritage conservation. ●

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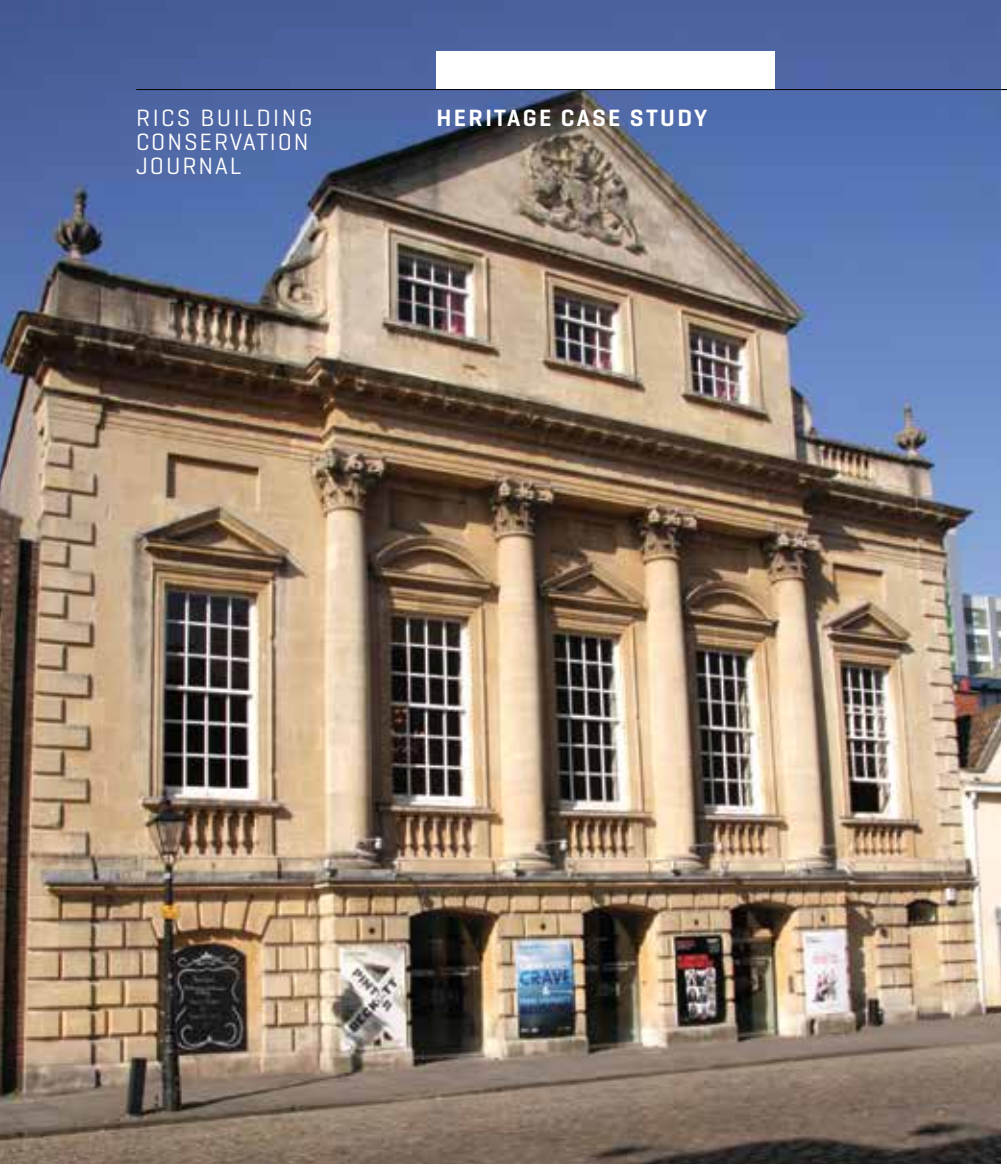

Peter Carey explains how a conservation management plan was integral to the restoration of the Theatre Royal, Bristol Old Vic complex

Behind the scenes

Conservation management plans (CMPs) have become integral to the heritage sector. They are predicated on the notion that defining heritage's value and assessing its significance will help to ensure any decisions that could affect those values are made objectively; but they are not primarily designed to respond to particular proposals. Since CMPs were introduced in the UK in 1996, there has been considerable variation in scope, quality and effectiveness, though.

Conservation context

Conservation plans were originally developed in Australia around 1982 in response to the Burra Charter, the document listing basic principles and procedures when Australian heritage sites or buildings undergo conservation. Since their widespread adoption in the UK by the Heritage Lottery Fund as an essential accompaniment to grant funding applications in 1996, they gained still wider support.

The scope, quality and effectiveness of these plans have sometimes veered on the exhaustive, leading to the development of lighter alternatives such as the conservation statement (CS). But both the CMP and CS are significance-based documents; the more onerous CMP requires the planning of specific actions, whereas the CS affords more rapid assessment of heritage value, often in response to a specific proposal or opportunity, but without a prescription for future action. Both documents are intended to help with design development and decision-making.

In contrast, heritage statements accompany planning or grant applications for specific development projects. One-off reports on the conservation strategy adopted in response to the CMP or CS, such statements discuss the impact of specific actions on the significance and heritage value.

Complex case study

To look at the way CMPs work in practice, we can consider the restoration of Bristol Old Vic's Theatre Royal.

The Theatre Royal is so-named as the original theatre of 1766 received a Royal Licence in 1775; the Bristol Old Vic is the name of the production company that took up residency in the theatre after the Second World War. In 1969, the Georgian building Coopers' Hall was gifted to the Theatre Royal Trust by Bristol City Council; the theatre and production company trusts have since merged.

Donald Insall Associates has been involved with the conservation of the Theatre Royal for more than 15 years. When we commenced work, we discovered that the theatre's archives were located at least four places:

1. in the Bristol city archive in B Bond Warehouse, which is well catalogued
2. in the College Green public reference library as part of city-wide archives, which are generally well catalogued
3. in Bristol University's Theatre Collection, which also includes the archive of theatre historian Kathleen Barker as well as playbills and other memorabilia; this collection is only partially catalogued
4. in boxes of files and other papers around the theatre itself, with even less cataloguing or organisation; one recent major grant allocation is for a joint initiative with the University of Bristol to sort and catalogue this material properly.

The sifting, collecting and collating of these diverse sources informed our understanding of the narrative of the theatre and its history. As a result, the bibliography and reference section in our CMP identifies the locations of these sources for any future investigation.

One of the primary problems with the building had been that the accumulation of changes and new elements over time represented different intentions and were of differing quality. The whole site – including, the Georgian theatre and the Coopers' Hall's remains, together with the

Upper circle painted box front from 1832, which had been covered by (above left) a 1950s "Georgian" colour scheme with decoration applied in the 1880s

20th-century alterations – was relisted as a grade I listed building in 2000.

The original stage house and ancillary buildings, such as the paint shop and scenery dock, along with the whole King Street front of house and façade and the complete interior of the Coopers' Hall, were demolished in the late 1960s, leaving merely the shell of the hall and the auditorium with its roof intact. But these controversial elements of the scheme by theatre architect Peter Moro were justified, because it was seen as necessary to keep the theatre alive as a highly significant work by a prize-winning architect of the day.

Would such a scheme have been allowed today? It is highly unlikely. However, it was a different era, with a different cultural ethos, a different approach to theatre and, certainly, a differing view of the value of heritage.

Our extensive documentary research exposed a surprising dearth of hard evidence about the interior or exterior of the early theatre, which meant that focused, primary research and investigation was needed before pursuing further alteration and improvement work projects.

The CMP was used extensively as a reference document in the run-up to the auditorium works. Since then, the plan has been revised and updated in anticipation of the so-called "Anniversary Works", which aim to remodel the front of house completely.

The process

One of the key elements identified early on was the need to provide accessible documentation that would be user-friendly despite being extensive and relatively exhaustive. The initial plan was to subdivide this into three volumes:

1. the general text: from the introduction to policies
2. illustrations maps, plans and photos
3. the gazetteer: the room-by-room reference, which serves as the primary record of value by element and location.

This three-volume format allows for more manageable content while enabling necessary revision and updating as and when further change occurs.

The problems

Many of the existing sources proved misleading, if not plain wrong.

For instance, there were no illustrations of the theatre's interior or stage before 1900. As this is the oldest surviving auditorium in the UK, which has been in near continuous use, insight into the development of theatrical styles over this period should not be better. But to gain such insight in the absence of a visual record, we have had to rely on documentary evidence, such as old playbills – that is, programmes – and newspaper records, which can often be inaccurate or exaggerate for effect. Other physical evidence on site can often be misleading or subject to misinterpretation.

It would be logical to report our findings from understanding through significance to policy, but the format would have meant the substance of the document was buried at the end. It was thought that if the order were reversed – starting with the conclusions and proceeding to the justifications – this might make it more useful as a guidance tool.

Major discoveries

The most satisfactory outcomes of the initial CMP were the findings of the investigation period it recommended before auditorium refurbishment. Considering that it is the only major 18th-century theatre auditorium still working as such in the UK, its history, particularly that of its early life, is of inestimable value. The research was able to overturn the following misconceptions.

1. The primary auditorium structure had been assumed to derive from 1800, with the addition of the gallery level. It was assumed that the creation of this upper-floor gallery had resulted in a significant replacement of original structure. But we were able to prove beyond doubt that the structure we see, particularly the storey-height posts, all dated from 1766.
2. The painted dress circle fronts of 1832 were supposed to be the sum total of the earliest decoration that survived. However, we were able to demonstrate that the remains of the 1766 interior decoration survived behind these painted canvas fronts.

It was commonly accepted that there had originally been boxes at stage level, which implied a proscenium door further upstage where indeed a door or doorway had appeared from available 20th-century visual records. But there should have been a third pilaster upstage again, as could be seen by comparing the structure to a sectional drawing of the London's Theatre Royal Drury Lane attributed to Sir Christopher Wren.

We were able to prove categorically that there was no such original stage-level box: the cut joist-ends of the original forestage linked with the current stage-box floor, all on a rake, indicating proscenium door entries, and the Garrick box – named for David Garrick, the leading actor of the Georgian period – indicated on the early booking plans was at first-floor level.

During investigations, we were also confidently told that nothing remained under the pit floor following Moro's creation of the new stage. However, we

1 Upper circle box painted panelled front behind the 1832 facade

2 Corinthian capital carved in perspective, raised in 1880s (note the fluting below hand)

were delighted to discover original flags from the stage subfloor, some timber floor plates to the orchestra pit and two sets of stone access stairs either side of the pit.

3. Access to the side upper circle was never totally clear, but we found proof of original side-stair access, confirming also evidence for the gallery originally being at that level.

The creation of the new gallery above the old one, which became the central upper circle had always been a mystery. The thought of the additional structure required to convert a ceiling into a full load-bearing floor suggested little should remain of the original structure. However, the central upper circle ceiling is the original gallery ceiling retained intact. The shaped side partitions are the original full-height gallery partitions, simply cut down at that time.

4. Not only did we discover the paint silhouettes of original bench ends throughout, but a box partition also remained, as did various seat parts and supporting elements, both in the central current gallery. This would have been installed in 1800, with the upper circle in place by 1766.

The CMP helped to redefine the relative heritage value of individual parts when classified together under the grade I listing. As it could only be based on existing scholarship, further primary research and investigation were identified as being necessary.

Work specifically looking into the auditorium provides the focus for the next phase of conservation. The results of this investigation have been highly significant in correcting some of the inherited misconceptions and have contributed significantly to improved comprehension of this unique historical jewel.

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Mineral paints after application to a property in an exposed clifftop location and (inset) 10 years later

Breathing space

Adam Brown explains the different types of breathable paints and evaluates their usefulness as a long-term response to damp

Water will always be present in buildings, so managing moisture is key: if water is allowed to accumulate, it can lead to issues such as damp or, in the worst case, structural failure. When it comes to renovating and decorating older buildings, breathable mortars such as lime have been proven to help manage moisture. But what about paint coatings? And how do we define what makes a "breathable paint"?

Vapour-permeable paint

We class "breathable paint" as a coating that can allow the transfer of water vapour. The premise is to allow water to evaporate from the surface, preventing it from accumulating in the building fabric.

There is no defined European standard for breathability, and consequently several ways currently exist to measure this quality. Until the conservation profession researches, presents and adopts a standard, this will continue to be an issue. A large number of paints on the market today claim to be breathable; however the measurement for breathability is taken against standards that are not specific to paint and cannot readily be compared. In the mean time, stream diffusion (SD) value or air layer equivalence – a German standard that measures the resistance of a paint coating and its ability to allow moisture to pass through – is the most commonly used method. The lower the SD value, the more vapour-permeable is the paint.

A breathable paint should have an SD value ranging from 0.01m to 0.5m – equivalent to moisture having to travel between 1cm and 50cm through static air to pass through the paint – meaning the coating has minimal resistance and vapour can pass freely without being slowed or stopped. Conventional masonry paints will likely have an SD value of 1 or more, equivalent to moisture having to travel 1m through the air, making transfer very difficult if not impossible.

When we call these paints "breathable", we are actually thinking about their permeability for vapour. In specifying or using a vapour-permeable coating, it is important to look for the SD value; every paint manufacturer should be aware of this figure.

Absorbing action

The most appropriate paint for historic fabric is one that has a low SD value – but bear in mind that absorption of a paint can also be a critical element in performance, especially for external decoration. Capillary action can force water into the fabric much more quickly than the permeable coating can expel the moisture, which can result in saturation.

Again, there is no standard definition for water absorption in paint coatings, but W24 value is a measurement of how many kilograms of liquid water a paint coating will absorb per square metre over a 24-hour period (kg/sq. m/day). The lower the value, the less water can enter the fabric.

If a coating is vapour-permeable, it will inevitably absorb some water; the rate that is acceptable will depend on the specific circumstances. Should the coating be applied to an exposed wall that is subject to wind-driven rains, then a low W24 value is required; if applied to a sheltered wall that is not subject to adverse weather, a low value is not so critical.

Suitability for historic buildings

Older buildings, usually meaning those built before 1919, are often fairly simple in terms of their construction, generally comprising thick, solid walls with no cavity, a feature that was introduced in the 1920s.

The result is that moisture will always be present in some form in the building fabric. The original coating materials, such as mortars and paints, were softer than the materials that they covered – for example, stone or brick – and thus allowed moisture to escape.

Modern construction has developed ways to manage moisture through the use of cavities and vapour-control layers. However, older buildings do not have the same provision, and rely on the fabric itself to control and enable moisture movement.

Damp is thus common in older buildings. Unfortunately, in some cases it is still thought that the only way to eradicate this issue is to waterproof the entire building with a coating such as masonry paint, or by injecting damp-proof courses to stop water penetrating the building. While this offers a temporary solution, it is never the answer, and the majority of these applications on historic buildings fail.

One of the main reasons for this failure is that a building can undergo significant movement during its lifetime, both structurally and thermally. Once a crack appears, water can penetrate the structure and remain in the wall behind the coating. A secondary issue with cracking is during the winter or colder months: as water becomes ice, it has an expansion rate of roughly 9% each time it freezes. As this freeze–thaw cycle is repeated at given temperatures, cracks widen, albeit at an irregular rate depending on their depth, pattern and the volume of water they contain.

Because water is usually driven into cracks by rain and wind, it evaporates into moisture under the dryer conditions present within the wall. Moisture then moves inside the wall, and though small amounts may escape back through the cracks, most of it will be unable to pass through the film formed by paint coatings, and it will thus work its way back inside the wall. Modern paints such as emulsions and masonry paints are classified as "film-forming" in this way because the chemicals they contain create a plastic-like layer enabling them to adhere to the surface of a wall or ceiling.

A build-up of moisture can cause blistering and bubbling of the paint where the water is trying to escape (see image, above right) and is referred to as hydraulic pressure. In more serious cases, the render may be blown – that is, forced off by the pressure of the trapped water. If accumulated water does not blow the coating, it can transfer internally, leading to issues such as damp.

Types of breathable paint

Vapour-permeable paints can come in many forms, with the most common discussed below.

Hydraulic pressure in action

Limewash

Limewash was the most widely used paint up until the 20th century due to the historic abundance of lime – a simple, easy-to-use coating that has protected a large number of historic buildings still surviving today.

As a material, limewash has no SD or W24 value; because there is no prescribed thickness or number of coats, it cannot be accurately tested, unlike other paints, which work on a set number of coats. However, limewash, which comprises lime and water, is inherently vapour-permeable. Its positive and negative characteristics are set out in Table 1.

When applied to a porous material, limewash soaks into the surface, absorbing carbon dioxide and converting back into limestone. As a result, it acts as a sacrificial layer that weathers away over time.

Traditional limewash can be very labour-intensive, with new renders usually requiring at least five coats before good coverage is achieved, as a result of its thin quality. Another major drawback to limewash is its questionable durability, because It offers very little resistance to abrasion and cannot be cleaned. Anyone who has ever brushed past a limewash will know that it can come off very easily.

Casein paint

This was a kind of limewash containing caseinate extracted from milk, hence the common name "milk paint". This addition offered

Table 1

Advantages and disadvantages of limewash

Advantages	Disadvantages
Easy to use	Labour-intensive application, requiring numerous coats
Economical to produce or purchase	Poor durability, especially when used externally
Historic precedent	Needs constant maintenance
Consolidates friable materials	Constant repainting can be costly
Vapour-permeable	Can only be applied to porous surfaces

superior durability – fewer coats needed to be applied, but it had to be used immediately after preparation.

Tallow limewash

Various additions were made to limewash to offer improved characteristics, such as workability and durability.

Animal fat was added to improve resistance to weathering. The tallow helped to prevent water ingress, but unfortunately reduced the vapour-permeability of the coating. Linseed oil was an additive similar to tallow that gave the same results.

While there is no defined addition rate for these materials, it has been found that 10% or less will not have too drastic an effect on vapour-permeability.

Distempers

These coatings commonly do not use lime as a binder, instead containing chalk as a filler and pigment and a glue as the binder.

Distempers were simple to produce, vapour-permeable and resistant to alkali, so could be painted over lime plaster relatively easily. The glue binder meant that they could be used on any surface – unlike limewash, which can only be applied to porous surfaces. The qualities of distempers are summarised in Table 2.

Mineral silicate paints

These were developed at the end of the 19th century. As with limewash, they soak into the surface and bond to it; where they differ is that limewash generally bonds to the calcium in the surface whereas mineral paints form a strong chemical bond with the silica in the substrate.

It is well known what a strong, stable mineral silica is. Widely used in building, the paints' bond makes them far more durable than limewash or distempers, with examples surviving for more than 100 years in Germany and Switzerland. Admittedly, these are far more favourable climates than the UK, although there are examples in this country of mineral paints surpassing 15 years, which is longer than film-forming paints last.

Mineral paints are available in many forms, for both internal and external use. Some offer a full chemical bond with the surface and others a passive bond where the paint can be removed. A sign of the former is that it cannot be removed with a paint stripper.

One drawback to mineral paints is that, as a result of this durable chemical bond, they are very difficult to remove from the surface. As they are bound to the surface, they will hold a consistent colour, whereas a limewash has the tendency to change, although some find that change attractive.

The features of mineral paints are set out in Table 3.

Protective priority

When dealing with historic buildings, understanding paint performance is vital. It is often the last thing considered during a project, but is the first thing everyone sees. Paint fundamentally serves as a protective coating, offering decoration as a secondary benefit: it has to be viewed this way.

Performance data is always vital when looking for suitable paints, and SD and W24 values are the simplest way to quantify the level of performance required. Sensitivity to the type of building being conserved or restored is also critical: for example, I would never advocate the use of a mineral paint on an ancient monument. For the majority of buildings, however, such paints will offer the client a durable and cost-effective coating.

Each building is unique and has to be treated as such. If the paint is to be applied externally, absorption also has to be taken into consideration. Durability and longevity can also affect both long-term performance and cost. If a suitable paint offers a higher durability but is more expensive, it can still offer a more cost-effective option in the long run.

Table 2

Advantages and disadvantages of distempers

Advantages	Disadvantages
Easy to use	Poor durability
Vapour-permeable, when not oil-bound	Modern distempers are expensive to purchase
Can be applied to numerous different surfaces	

The use of traditional limewash internally

Table 3

Advantages and disadvantages of mineral paints

Advantages	Disadvantages
Unsurpassed durability	Initial material cost can be high
Long-term protection of the fabric	Can be difficult to remove
High vapour-permeability and low absorption	Lack of historical precedent when compared to limewash
Very low maintenance	

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UPDATE

+info

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Heritage Counts 2016

The Historic Environment Forum and Historic England have published their annual report on the heritage sector in England, *Heritage Counts*. One important new stream of data is on heritage and the economy. Among its findings are:

- heritage generated £10bn in gross value added in 2013; if indirect and induced effects are considered, this number is £21.7bn, which equates to 2% of the national total value added
- in 2013, there were 164,100 jobs in heritage employment; the figure rises to 328,700 if indirect and induced heritage employment is added, which equates to 1% of total national employment
- domestic and international tourism generated £18.4bn of expenditure in England in 2014, supporting 285,000 jobs; heritage tourism accounted for 22% of all tourist spending in that year
- statistics from the Heritage Lottery Fund from 2010 indicate that, for every pound spent on a heritage visit, 32p is spent on site and the remaining 68p is spent in local restaurants, cafés, hotels or shops
- in 2015, UNESCO estimated that the financial benefit of World Heritage Sites in the UK was £85m per year, as the brand is a strong marketing tool.

Interestingly, heritage tourism is more popular in England than in most of Europe. UK citizens have the fourth highest visit rate to historic monuments or archaeological sites, at 65% in 2016. According to Visit England, the four most visited paid attractions in England are the Tower of London (2.8m visitors) Westminster Abbey (1.7m), Kew Gardens (1.6m) and St Paul's Cathedral (1.6m).

Data from Colliers in 2011 shows that listed properties also generate a higher level of total return on investment, while the commercial property data source Investment Property Databank (IPD) Listed Property Index generated a higher level of total return than the wider IPD index for three-, five-, 10- and 30-year time periods.

The heritage indicators section of *Heritage Counts* offers some interesting statistics. The number of listed building consent applications as a proportion of all planning applications has increased from 5.7% in 2007/08 to 7.1% in 2015/16. There has also been a decline in the number of local authority conservation staff, which has dropped by 35% from 2006 to 2016.

Heritage Counts also provides updates on the basic number of protected heritage assets, reporting that there are 376,577 listed buildings; 19,848 scheduled monuments; and around 10,000 conservation areas (as these are local authority designations, their numbers are estimated).

https://historicengland.org.uk/research/heritage-counts/

SAP changes

The Department for Business, Energy & Industrial Strategy is proposing to revise the Standard Assessment Procedure (SAP) for solid walls. The recent consultation on revisions suggests reducing the U-value to 1.7W/m²K from the current 2.1W/m²K.

Research in recent years has shown that U-values measured in situ are lower than previously thought. The Sustainable Traditional Buildings Alliance says the recommended 1.7W/m²K level is still slightly higher than indicated by recent reports from University College London and BRE, but it would still be a very welcome change for several reasons:

- savings from solid-wall insulation have been overestimated, so government policy on retrofitting would enable focus on more cost-effective measures as part of a whole-building approach
- SAP scores for traditional buildings will improve, and this may have an impact on their energy performance certificate (EPC) ratings
- under the Minimum Energy Efficiency Standards, it will be illegal to let out private properties with an EPC rating lower than E from 2018.

Consultation on the proposals closed at the end of January.

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