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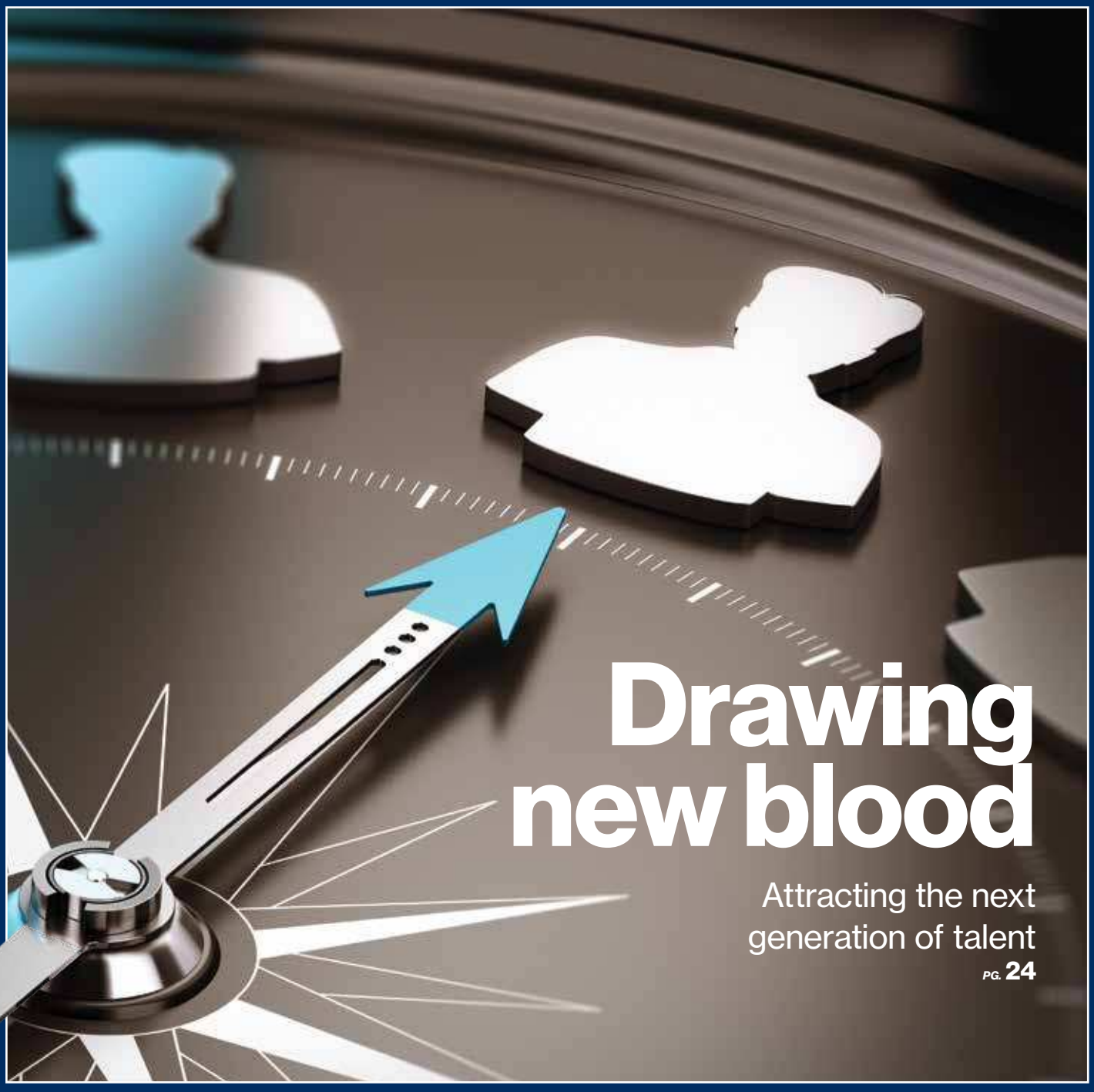

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OPINION

Alex Charlesworth reflects on health and safety, apprenticeships and the Alterations Protocol

Taking care

According to the Health and Safety Executive's report *Health and safety in construction sector 2014/15*, the construction industry is the eighth worst industry for work-related and non-fatal injuries, which equates to 3% of workers in the sector, on average, over three years (*http://bit.ly/1hVYwCx*).

Health and safety is clearly then of paramount importance, and I would urge you all to pay particular attention to the RICS professional statement *Surveying safely* when it is published (see p.12). RICS is striving to become more regulatory, which will mean that members will have to adhere to, rather than simply be guided by, the information given in the document. Building surveyors have an important role to play in helping reduce this rate of injury.

Meanwhile, the Construction (Design and Management) Regulations session at this year's RICS Building Surveying Conference proved a popular one. However, it is clear that there is still some ambiguity as to the role the principal designer now has and the responsibilities building surveyors play in the process. The articles in this issue should help to answer some of your questions about these (see pp.6–7 and pp.8–9).

Apprenticeships

You will be hearing more and more about apprenticeship schemes during the next 12 months. This is partly a result of our drive to recruit a new generation of building surveyors (see pp.24–25) and partly because of the government Apprenticeship Levy, due to be introduced in April 2017. The levy will apply to employers with a wage bill of more than £3m, who will have to pay a 0.5% levy against this to fund apprenticeships.

Businesses are now being encouraged to take on apprentices, and subsequently the RICS has launched trailblazer apprenticeships in the UK. These give apprentices the opportunity to have both a job and substantial training and development, enabling people of all ages to earn while they learn.

Already there are Level 3 surveying technician apprenticeships and Level 6 chartered surveyor degree apprenticeships covering areas of practice such as building surveying. Apprentices spend part of their time at university and part with their employer, though there is flexibility over how best to arrange this (see p.5).

Currently, too few employers and universities are offering the schemes, but this will change, and I urge both employers and universities to take them on. Apprenticeships are fully supported by the Building Surveying Professional Group Board.

The Alterations Protocol

You may have noticed the recent arrival of the Alterations Protocol, following in the footsteps of the Alienation Protocol, and again brought to us by Falcon Chambers and Hogan Lovells. The introduction of guidance in previously under-advised or grey areas of commercial property is welcomed by the building surveying profession, and I hope that this will prove to be the first of many similar property protocols (*http://bit.ly/1hVYwCx*).

The Alterations Protocol deals with the common situation whereby a tenant wishes to make changes to their premises but this is restricted under the lease. A building surveyor will typically liaise with the tenant regarding their application for consent and subsequently provide a recommendation to the landlord for entering into a licence for alterations. Historically, this can be time-consuming and frustrating for all involved.

The protocol aims to reduce disputes arising during the process, and sets out step-by-step best practice guidance. It recommends that tenants provide their supporting documentation as a single package, and that the landlord should not unreasonably withhold their consent. It also addresses issues such as undertakings and dispute resolution, and makes reference to the unfamiliar Part I of the Landlord & Tenant Act 1927.

With respect to costs, a tenant should also offer to pay these and provide an enforceable understanding to meet them. The protocol gives guidance as to what these costs may relate to, including the need for external professional advice.

In my opinion, it would be reasonable for the costs for a landlord's professional advisor to be taken into account where the alterations are complex. This could include, for example, where they affect other tenants or neighbours, make changes to the structure, add loading, affect fire precautions or install mechanics or electrics that may alter the balance or loading of the base build. No doubt, we will be seeing some debate around the Alterations Protocol in future.

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UPDATE

Apprenticeship programmes

The University College of Estate Management (UCEM) has partnered with Chartered Surveyors Training Trust (CSTT) to deliver Level 3 and Level 6 apprenticeship surveyor programmes. Level 3 is broadly equivalent to 2 A levels, and Level 6 includes a BSc Honours degree. Both apprenticeships are linked to, and include, the achievement of a professional qualification – AssocRICS for Level 3 and MRICS for Level 6.

Over 130 apprentices have already started on the new programmes, and at least 170 more are expected to start in 2016. According to figures published the Construction Industry Training Board, the number of new construction apprenticeships has hit a six-year high, and demand is likely to be even higher once the government's Apprenticeship Levy is introduced in April 2017.

http://bit.ly/1UyRFju

BEPE

The Built Environment Professional Education Project (BEPE) aims to continue the legacy of the London 2012 Olympic and Paralympic Games by helping to change the way inclusive design skills are taught in the UK. The aim is for all built environment professionals to receive mandatory, high-quality teaching on inclusive design so that they can help create inclusive buildings, places and spaces for future generations.

After more than two years of support from the government and the Greater London Authority, BEPE has the active support of 18 major institutions and organisations in the sector, prompted changes to professional standards and competencies and raised the profile of inclusive design among professional educators and students.

http://bit.ly/1T4vnWt

Publications

The NHBC Foundation has published guidance on ventilation, heating and renewable energy systems for new homeowners. It points out that the incorrect use of home ventilation can exacerbate condensation, mould and air pollutants, which can affect health and the comfort of the home.

http://bit.ly/1Pg1Cvq

The House of Lords – the UK parliament's second chamber – has published its *Building Better Places Report* as part of the Select Committee on National Policy for the Built Environment.

http://bit.ly/1Q4ToLR

RICS training

The RICS has introduced a training catalogue that includes more than 200 online and face-to-face training courses, all run by industry experts. Topics covered include building surveying, building information modelling and construction contracts.

http://bit.ly/1ZhQbt1

Enterprise Act becomes law

The Enterprise Act 2016, which introduces damages for late payment, received Royal Assent on 4 May.

http://ow.ly/4ns9It

Subsidence Forum

The Subsidence Forum is to hold a training day at BRE Watford on 20 October. It will include presentations on the financial ombudsman service, Japanese knotweed, High Speed 2 and Crossrail, tree issues, computer-controlled grouting and satellite mapping. Book early to avoid disappointment.

www.subsidenceforum.org

In brief...

Events

Building Conservation Summer School

4–8 September, Cirencester

Organised by RICS Building Conservation Forum and the Society for the Protection of Ancient Buildings, the summer school will include lectures, case studies and practical workshops, offering attendees a greater understanding of conservation philosophy and techniques.

http://bit.ly/1NcOLMc

Dilapidations Forum Conference

22 September, London

The RICS Dilapidations Forum is the only industry-led dilapidations conference, providing technical updates on dilapidations claims and case law outlining the liabilities and obligations of landlords and tenants.

www.rics.org/dfc

RICS Building Surveying Annual Dinner

3 November, London

The perfect occasion to celebrate your achievements with fellow colleagues, the annual dinner will be held at the Four Seasons Hotel on London's Park Lane. Featuring a high-profile after-dinner speaker and live magic, this is an opportunity to entertain clients and network with like-minded industry professionals. For more information, please contact RICS conference logistics coordinator Cindy Tang on nctang@rics.org

Doing your duty

Ashley Morris explains what the Construction (Design and Management) Regulations 2015 mean

The Construction (Design and Management) Regulations 2015, or CDM Regulations, apply to all construction work. The structure, complexity and duties and roles they set out have changed considerably since the 1994 and 2007 iterations, but the core concepts and principles remain.

Role over

Industry perception that the construction, design and management coordinator (CDMC) was often ineffective and remote played a large part in the decision to remove the role in 2015.

CDMCs themselves felt that many of the issues behind this could be traced all the way back to poor client behaviours that had set in following the introduction of the confusingly titled "planning supervisor" in 1994 – behaviours that the 2007 regulations failed to eradicate completely, despite the best efforts of enlightened project teams.

For the 2015 regulations, the Health and Safety Executive (HSE)'s response was to create a new duty holder, the "principal designer" (PD), with other CDMC duties passed to the client.

The CDMC's demise does not mean the skills, knowledge and experience of those practitioners has been lost. Many CDMCs are very well placed to continue to manage, coordinate and control the health and safety aspects of design effectively during the pre-construction phase in the role of PDs.

During the consultation period for the new regulations, some initial interpretations of who could or could not be PDs left many practitioners who had become "full-time" CDMCs worried that their workload might potentially disappear before their eyes, convinced they either could not or should not undertake the new role.

However, calmer reflection showed that the new regulations offered increased opportunities for suitably qualified and experienced practitioners to act as PDs, as advisors to PDs (who may otherwise feel unable to fulfil the role) or as advisors to clients, to help them meet their new, widened range of duties.

> "In many of the roles undertaken routinely by chartered building surveyors, we are acting as designers under the terms of the regulations

First principals

The identity of the PD has been the major question arising from the new regulations.

- A PD must be a "designer" as defined by the regulations, but it is not an express requirement that, in order to act as PD on a particular project they must be appointed as a designer on that project, although this may well be a preferable arrangement.
- The PD must have the necessary skills, knowledge, experience and (if a company) the organisational capability to perform the role.
- Everyone working on the project who might be considered for the role of PD must objectively decide whether they are best placed to do so. To act effectively, the PD must be fully integrated into the project team from the outset rather than peripheral to it, or else they will run the risk of repeating the same failings that were laid at the door of the CDMC.

The definition of "designer" under the regulations is a wide-ranging one, and includes professional advisors, clients and contractors. HSE guidance confirms that "chartered surveyors and technicians" are also designers, so there would appear to be nothing in the definition to prevent surveyors acting as PDs, subject to the tests outlined above.

Regulation 9(2) of the CDM Regulations 2015 requires designers to "take into account the general principles of prevention and any pre-construction information to eliminate, so far as is reasonably practicable ("sfarp"), foreseeable risks to the health or safety of any person –
(a) carrying out or liable to be affected by construction work;
(b) maintaining or cleaning a structure; or
(c) using a structure designed as a workplace."

Regulation 9(3) goes on to require that where risks cannot be eliminated, the designer must – sfarp – take steps to reduce or control these through the subsequent design process, provide information on them to the PD, and include appropriate information in the health and safety file.

Regulation 9(4) also requires the designer to take all reasonable steps to submit sufficient information about the design, construction and maintenance of the structure along with the design to assist the client, other designers and contractors adequately enough to comply with their duties under the regulations.

In many of the roles undertaken routinely by chartered building surveyors, we act as designers under the terms of the regulations. Our core competencies and experience in construction technology, inspection, building pathology, specification, maintenance management, building/component lifecycle awareness and all the associated soft skills mean that we are extremely well placed to consider the requirements of Regulation 9 when preparing or reviewing designs where we have the skills, knowledge and experience to do so.

By design

Integral to discharging designer duties under Regulation 9 is the concept of design risk management (DRM). It is vital for all designers to recognise that successful DRM is about risk elimination, reduction and control, not just about risk assessment. So the DRM process requires more than simply identifying residual hazards and providing information to the contractor to deal with the risks arising.

Where hazards cannot be eliminated, designers must reduce risks through their design decisions. Reliance on the contractor on site to provide protection to workers and others must be seen as a last resort, although this remains a common approach, often seen in the "action" column of risk assessment tables.

There is no requirement for designs to be "risk-free" or deal with circumstances that cannot be reasonably foreseen. The approach, the solution reached and the information provided must always be proportionate to the task at hand. Designers must be able to show documentary evidence that they have applied the principles of prevention and passed that information to those that need it in a succinct format, such as notes on drawings, rather than buried it in tables of generic risk assessments.

The regulations are not intended to stifle design flair but do require that the elements as they are designed can be constructed, operated, occupied, maintained, altered and taken down without threatening health or safety.

This principle extends beyond the construction phase to future occupation and maintenance operations, which is where building surveyors should have a natural advantage in being able to anticipate the issues and deal with them at design stage.

Healthy attitude

Designers' awareness of all construction-related health and safety issues and not merely the significant risks and issues is key. However, while safety issues are well understood by most, those relating to workers' health are less so, with a few notable exceptions such as asbestos. However, the economic cost of work-related health issues far outweighs that of safety issues.

According to figures provided by the Association for Project Safety, work-related ill health accounts for two-thirds of the £14.3bn cost of work-related injury and ill health in the UK. The HSE's Chief Inspector has also commented that "each week 100 construction workers die from occupational diseases".

Silica dust, UV radiation, hand–arm vibration, musculoskeletal disorders, dermatitis and noise-induced hearing loss are just some of the issues that superficially appear to be about site-based activities and individual protection measures, but that can be avoided in the first place by careful design and provision of accurate information in the pre-construction phase.

For instance, can joints in masonry or paving be designed so that units don't have to be cut on site to suit, thus reducing noise, dust creation, repetition and vibration? Can the number of fixing holes, and the drilling they require, be reduced for the same reasons? Is it possible to specify lighter materials or ensure that there is a feasible way of providing mechanical handling assistance to reduce risk of musculoskeletal injuries? Designers must not leave these issues to the contractor or operatives to resolve on the day.

What appear to be relatively straightforward design decisions can throw up many further questions – some of which will be answered in the ordinary course of events, while others may not. Timely design-stage risk management workshops can help identify such additional questions and solutions.

Where design-stage health and safety issues are reasonably foreseeable, leaving the resolution of any such questions to the contractor during the build or to the owner or occupant of the building (or their maintenance contractor) after completion is not an option if you are to complete your design risk management obligations and properly discharge your legal duty as designer or PD.

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Related competencies include
Contract Administration, Contract Practice

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Paul Lennon discusses issues raised by the changes to the Construction (Design and Management) Regulations 2015

One year on

It is fair to say that, one year on, the Construction (Design and Management) or CDM Regulations 2015 have received a mixed response. Some believe the new iteration is the best thing to have happened to the CDM Regulations for many years. For others the predominant view is: why change something that is not broken?

The ethos and emphasis of the regulations are to implement EU Directive 92/57/EEC, the Construction Sites Directive, and ensure the principles of prevention are being applied by all duty holders across every construction project. For some, though, the regulations are seen as added bureaucracy in an already over-legislated field.

Building surveyor queries

At Baily Garner, we have endorsed the changes to the regulations, which in broad terms have simplified the regulations .However, a number of building surveyors have requested clarification on the regulations. Questions have included the following.

- As a "designer", can I act as a principal designer (PD), and more importantly, do I have the skills, knowledge and experience to fulfil this new role? In addition, can the holder of the now-defunct construction, design and management coordinator (CDMC) role become the PD?
- Some design and build contractors are reluctant to take on PD duties, and in certain cases even refuse to do so. Can they do that when they take a lead on the design process?
- The role and duty of the PD can also change depending on the procurement route and stage of the project; i.e. from concept and early design to planning. This has also prompted questions around timing and who should pick up the role of PD. Is this a viable and practical option?
- Depending on the procurement route, some clients see a conflict of interest if the design and build contractor is also the PD. Why?
- The number of projects requiring additional duty holders – specifically a PD and principal contractor – has now increased, particularly where there is likely to be more than one contractor engaged. This will therefore include more maintenance and day-to-day repair contracts. How can duty holders be appointed, in the light of the fluid and quick-moving targets those duties now impose on such schemes?

Client queries

Other questions posed relate to the client, as the CDM Regulations 2015 now place "significant" extra duties on them compared with the 2007 iteration. The role of the CDMC has been phased out, which means our clients do not have the benefit of their advice. Questions raised by clients include the following.

- How can I ensure compliance if I do not possess the relevant skills, knowledge or experience to carry out these additional duties?
- What are my liabilities?
- Can I appoint someone to help me discharge these duties?
- How can I ensure the construction phase plan is drawn up?
- How do I ensure the PD and principal contractor fulfil their duties?

It is fair to say that building surveyors are the first people that our clients approach, and understandably surveyors want to give their clients the best advice. Depending on the complexity of the project, we would advise on the appointment of a CDM advisor to help clients with their duties and thus satisfy their extra obligations. The new duties still require the construction phase plan to be "drawn up", but what does this mean? What is the impact if it is not suitable and what – more importantly to our clients – is the liability on them as individuals or businesses?

You can see why there is an opportunity for clients to seek support and comfort by instructing a health and safety practitioner with CDM experience in this field. There is certainly still a role for former CDMCs to provide advice and add value on larger projects as identified in the guidance.

This has led to clients retaining a CDM advisor to ensure due diligence and implementation of the regulations on a number of construction projects.

Doubling up

Further questions have been raised around a possible dual role incorporating both CDM advisor and PD, which the majority of our clients prefer. But how would this work, and is it not an inherent conflict of interest?

I would suggest that it is not, as this is exactly the situation that would arise if the client did not appoint a PD. Both duties would fall to the client themselves, so there would be one organisation acting in both capacities.

It is clear that the client has an enhanced duty, which has resulted in a

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number of health and safety advisors and former CDMCs now offering support in the form of a CDM advisor, in order to fulfil these new duties. The Association for Project Safety has subsequently produced terms and conditions for the appointment of a CDM compliance advisor, and this has been welcomed by a number of our clients.

It is seen as a positive move by those clients who recognise that a key part of their business is to ensure compliance and lead by example. Building surveyors should also look for help and advice where necessary to ensure they are likewise providing their clients with the best health and safety advice.

It makes sense to combine both services and commissions as, ultimately, the aim and function of the regulations is to manage health and safety on a construction project. The PD's role and duties are to plan, manage and monitor the pre-construction phase and coordinate matters relating to health and safety only.

The title "designer" has confused some people, as the questions above demonstrate, given that it suggests they have to be the designer on the project itself. The Health and Safety Executive (HSE) has clarified this point on its website by indicating that the post holder has to be a designer or an organisation that provides design services, but that they do not have to be employed on the project in a design capacity.

Given that the 2015 legislation focuses on the principles of prevention, we likewise advise our clients that the PD must be a designer in some professional capacity but not necessarily the designer on the project.

The PD must plan and manage the flow of health and safety information, coordinate with the project team and monitor compliance with the CDM Regulations. Design and build contractors could and should take on the role if they have the relevant competencies, that is, the skills, knowledge and experience.

They can seek help from third parties to discharge their duties, but the contract must be between the client and design and build contractor as PD. This does not sit well with some client groups. As previously identified, a PD must be a direct appointment, which has prompted some clients to commission them on a stand-alone basis, and this is an acceptable approach.

The legislation is silent on the limitations regarding who can assume the role of PD when it comes to maintenance and day-to-day repair projects.

The view of and guidance from the HSE is that it should be proportionate to the risks involved. The title "designer" under the CDM Regulations 2015 is a generic definition and not specific to a particular project in question. Therefore, the key for any building professional taking on the role of PD is to ensure that they understand how health and safety is managed through the design process and on into the occupation, use and maintenance of the building. Knowledge of the principles of prevention is essential to fulfil the duties.

Continuous professional development is key to ensuring that we have the skills, knowledge and experience to provide our clients with clear advice to fulfil their obligations. It is therefore important that we make a professional and measured judgement on how to best manage our CDM projects and take an approach that is proportionate to the risks involved.

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Related competencies include
Contract Administration, Contract Practice

Peter Martin considers the health problems posed by rats

Smelling a rat

Urban legend has it that you're never more than six feet away from a rat. While research suggests that rats are not nearly so prevalent, they are regularly encountered – dead and alive – by building surveyors in the course of their work. As rats can carry a range of diseases, including the potentially fatal Weil's disease, it is important to take appropriate precautions when surveying.

In the UK the brown rat, *Rattus norvegicus*, is one of three commensal rodents; that is, creatures that are closely associated with human activities. Sewers, canals and rivers are prime brown rat habitats, but so too are run-down or derelict areas near readily accessible food sources, including takeaways and areas where rubbish has accumulated. Such is the rats' affinity with water that problems associated with them are compounded following flooding. They can – and do – live practically anywhere.

Infection

There can be few building surveyors who have never come across a rat at some stage in their career. All surveyors should be aware that exposure to rat urine or water that is contaminated with it can lead to Weil's disease, which is a serious form of leptospirosis.

The bacterium that causes the infection can enter the body through cuts and scratches, and through the lining of the mouth, throat and eyes. Following initial flu-like symptoms, a severe headache, vomiting and muscle pain, Weil's disease can cause jaundice, meningitis and kidney failure. In severe cases, it can be fatal. Clearly the risks are highest where there is evidence of an ongoing rat infestation, but infection is still possible even where their presence has been eradicated.

Rats can also transmit other diseases to humans, which include listeria, rat-bite fever, salmonellosis, toxicaria and toxoplasmosis.

Before conducting a survey, surveyors should follow the advice given in the RICS guidance note *Surveying Safely*, 1st edition (see p.12 of this issue) and carry out a pre-assessment of the hazards and risks that are likely to be encountered on site.

For instance, are there rats known to be present, or is the nature, condition or location of the building such that you might presume their presence? Are there toilet or washing facilities available on the site? Before you set out, make sure that any cuts or grazes are covered up with waterproof dressings. Having gloves and plasters with you is a good additional precaution.

During a survey, be particularly vigilant in areas such as basements and roof voids. Be aware of the following signs that there may be rats present:

- electrical cables, rubber pipework or pipe insulation that have been chewed
- rat droppings, which have a characteristically spindle-like shape, are around 20mm long and are usually found in groups
- smudge marks along walls or hairs caught on low-level brickwork
- scratching or scurrying noises in the walls and above ceilings
- nests and piled nest materials.

Even in the absence of clear evidence, it does not necessarily mean that rats are not present.

If you cut yourself during a survey, you should immediately wash your skin with soap and running water before covering the cut with waterproof dressings. Avoid hand-to-mouth contact. Try to take your breaks away from the building, and always wash your hands before you have anything to eat or drink.

Attacks are rare

While rats rarely attack humans, you should never corner a live rat: it could jump at you and give you a vicious bite. Equally, do not touch a dead rat with unprotected hands. If you really need to move the rat, you must wear gloves.

After a survey, if you think you may have been in contact with rat urine and you begin to experience flu-like symptoms, you should seek medical attention as soon as possible. Do not wait until jaundice sets in because early treatment is essential to shorten the illness and reduce its severity.

The Health and Safety Executive leaflet *Leptospirosis: Are you at risk?* INDG84(rev1) includes a card to show your doctor (*http://bit.ly/1YIFFLX*). Under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013, the Executive must be notified of any confirmed instance of Weil's disease.

Infections caused by rats are very rare, but it is wise to take the recommended precautions. Surveyors should also be aware of dangers to health from creatures including mice, birds – especially pigeons – bees, wasps and other insects such as lice, ticks and fleas, and biohazards including bird droppings (guano), birds' nests and anthrax, the latter of which can be present in very old haired plaster.

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Related competencies include
Health and safety

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Getting serious

Mike Appleby reviews the tougher new sentencing guidelines for health and safety and corporate manslaughter offences

The Sentencing Council guidelines *Health and Safety Offences, Corporate Manslaughter and Food Safety and Hygiene Offences* that came into force on 1 February apply to England and Wales and will probably be followed in Scotland. As with other recent guidelines, including those for environmental offences, sentences are based on categories of culpability and levels of harm (*http://bit.ly/1YBAeiF*).

As a consequence of these new guidelines, fines will rise dramatically: it seems just a matter of time before the record fine of £15m, imposed on gas network operator Transco in 2005 for an explosion killing a family of four, will be exceeded. However, lowering the custody threshold for convicted individuals is also a matter of concern.

Sentencing companies

When sentencing companies for health and safety offences, the court first considers culpability, categorised as very high, high, medium or low. It then assesses harm by assigning a 'harm category' ranging from 1 (highest) to 4 (lowest). The harm category is determined by reference to the potential level of harm – which may be higher than the harm actually caused – compared with the likelihood of harm occurring, whether high, medium or low.

The culpability finding and harm category are then applied to a table that classifies companies according to four categories of turnover: micro (under £2m turnover), small (£2m–£10m), medium (£10m–£50m) and large (£50m and above). This table gives a starting point and sentencing range. Listed aggravating and mitigating factors are then applied, increasing or decreasing the fine. The resulting amount can then be reduced by up to a third if the company has pleaded guilty.

A similar approach is taken for convictions under the Corporate Manslaughter and Corporate Homicide Act 2007. An offence category – either A for the more serious or B for less – is determined by reference to factors such as how foreseeable serious injury was and how far short of the appropriate standard the company fell, and this category is then applied to a table of sentencing ranges using the same turnover classifications. Aggravating and mitigating factors and reduction for a guilty plea are subsequently considered.

> As a consequence of these new guidelines, fines are going to increase dramatically

The maximum fine for a health and safety offence given in the tables for a large company with very high culpability is £10m, and for corporate manslaughter £20m. But these should not be seen as a ceiling. The guidelines say that for companies with a turnover significantly more than £50m, the court may move outside the suggested ranges.

In the environmental case R v Thames Water [2015] EWCA Crim 960, where the defendant's turnover amounted to £1.9bn, the Court of Appeal warned: "In the worst cases ... [t]his may well result in a fine equal to a substantial percentage, up to 100% of the company's pre-tax net profit for the year[,] ... even if this results in fines in excess of £100m."

Sentencing individuals

The guidelines also apply to individuals convicted of health and safety offences. Under the Health and Safety (Offences) Act 2008, if convicted in the Crown court the individual faces a maximum sentence of two years' imprisonment.

As for companies, the guidelines require the same approach of determining culpability and assigning a harm category then applying these to a table of sentencing ranges. In the past it has been rare for a prison sentence to be handed down. However, where there has been a fatality and the court finds high culpability, custody will now be a real possibility.

In December 2014, a health and safety advisor was convicted of breaching section 7 of the Health and Safety at Work etc. Act 1974 and sentenced to nine months' imprisonment. This followed a trench collapse at a residential property killing a construction worker involved in ground excavation works. The advisor was contracted to attend site once a month and last visited nine days before.

At the time of the fatality, the method statement drafted by the advisor was not being followed. During the sentencing hearing, the judge made specific reference to the then recently published draft proposals that have led to the new guidelines.

Given the high stakes, we can expect more trials and fact-finding hearings to determine the level of guilt or 'Newton hearings'. Companies wanting to challenge any resulting prosecution will need to think carefully at the outset of the investigation about their tactics and preparation. For individuals, they need to consider how they would obtain independent specialist legal advice: if they are not covered by their employers' insurance, then they should give serious consideration to investing in their own.

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Related competencies include **Health and safety**

Keeping it safe

Anthony Taylor provides an update on the forthcoming RICS *Surveying Safely* professional statement

The RICS guidance note *Surveying Safely*, 1st edition (*http://bit.ly/1pkUfxX*) is in the process of being updated, and it has also been selected to be one of the first new professional statements, a number of which will be published over the next few months.

This new status means that members will have to adhere to, rather than simply be guided by, the information given in the document. All members will be expected to deliver their professional services to a standard of health and safety at least to the level set out in the professional statement. However, it may be that the standards in *Surveying Safely* will need to be exceeded.

New sentencing guidelines

This revision is particularly timely given that, first, there have been significant changes to the Construction (Design and Management) Regulations that came fully into force in April 2015 (see pp.6–7 and pp.8–9 of this issue) and second, new health and safety sentencing guidelines were introduced in February by the Sentencing Council for England and Wales (see p.11).

These guidelines have been put in place to help both magistrates' and Crown courts in handing down consistent sentences for all convictions of health and safety, food safety, environmental offences and corporate manslaughter. They are designed to ensure sentences that are proportionate to the size of the organisation, and they state: "The fine must be sufficiently substantial to have a real economic impact which will bring home to both management and shareholders the need to operate within the Law." They explicitly describe the objectives of sentencing as: "Punishment, deterrence and the removal of any gain derived through the commission of the offence." The ante for health and safety compliance has been significantly raised.

Greater emphasis is now also being placed on the health aspect of health and safety. With around 5,000 individuals continuing to be afflicted by asbestos contamination a year – the effects may take 40 years to become apparent – greater attention is also being paid to other contaminants including dusts such as silica, the as-yet unknown potential effects of nanotechnology and air polluted by emissions of all sorts.

> "All members will be expected to deliver their professional services to a level of health and safety set out in the professional statement

In October, the All-Party Parliamentary Group on Occupational Safety and Heath published a report that calls for urgent action to remove asbestos from UK workplaces and public buildings (*http://bit.ly/1Gp2eBp*), with complete removal recommended by 2035. The government has yet to decide on what action to take, but its likely direction can be clearly seen.

In January this year, an alliance of contractors, clients, the Health and Safety Executive and other trade representative bodies established the Health in Construction Leadership Group (*http://www.healthinconstruction.co.uk/*). To date, it has gained a commitment from around 170 leading firms to focus on tackling ill health and disease throughout the sector.

Awareness

In 2014, the RICS Health and Safety Advisory Group repeated a health and safety survey of members in the property industry first conducted in 2011 with input at that time from the University of Portsmouth. The group also anticipate repeating the survey later this year.

It is interesting that 11% of members who responded to the survey thought that "awareness" was a problem in relation to managing health and safety in their organisation, higher than the 6% who responded this way in 2011. Also, while 64% of members said they were involved with health and safety issues at work, this had fallen from 73% in 2011 (see *Building Surveying Journal* March/April 2015, pp.20–21).

It is therefore critical that all members review their operational practices in line with the new professional statement. To this end, a checklist is also provided in the statement that sets out the criteria against which compliance with the standard will be judged, in the event that the RICS finds it necessary to do so.

It also includes for the first time the concept of the "safe person", effectively seeking to ensure that each individual accepts responsibility for their own actions. While the organisation retains responsibility for ensuring that people have the tools to do their job safely and in good health, the individuals themselves need to retain responsibility for their own health and safety. This is because the individual is best equipped to look after their own wellbeing – not least ensuring they have all relevant competencies, including a clear comprehension of their own limitations.

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RICS *Surveying Safely* professional statement is due to be published later in 2016

RICS also recently published the guidance note *Health and safety for residential property managers*, 1st edition for the UK.
http://bit.ly/207P8Sk

Related competencies include
Health and Safety, Legal/regulatory compliance

Risky business

In the first of three articles assessing site risks, **Gary Blackman** considers pre-visit issues

According to the Health and Safety Executive (HSE)'s report *Health and safety in construction sector 2014/15* (*http://bit.ly/1hVYwCx*), there were 35 fatal injuries in construction workplaces that year along with 65,000 non-fatal ones. These injuries included slips, trips and falls (23%), falls from height (19%) and being struck by an object (11%).

While most of these injuries involved construction workers, building surveyors can also be at risk. In an age where corporate manslaughter means that we are not immune from prosecution, managing risk for ourselves and our employees is a fundamental part of our daily lives.

Quite often when we are visiting buildings or sites for the first time, we will know very little about them other than what our clients tell us or what we have gleaned online.

Measuring risk

So how do we measure risk when we have not been to the building or site, and there is little or no information or documentation? Measuring risk will obviously depend on a number of factors, including:

- whether the site is vacant or occupied
- the type of building or site
- the purpose of our visit
- whether we are working at height.

There are two key aspects that enable us to assess risk: one is hazards – that is the potential harm – and the other is the risk itself, the likelihood of those hazards happening. Where the severity and likelihood of potential harm increases, so does the risk.

There are many pro forma risk assessment forms available, and the HSE also provides some excellent guidance on creating your own (see also p.12).

Assessing risk

So how do we assess the risk?

After identifying the hazards and the likelihood of harm, we must then manage them so as to reduce the risk to an acceptable level and minimise the chances of personal injury.

The hazards that we encounter during our working day are numerous and varied, and they will depend on what tasks we are undertaking.

Let's use a typical example – working at height.

If we were to fall more than 2 metres it is highly likely that we will be seriously injured, or even die. Therefore the severity is high and, looking at Table 1, "high" is given a rating of 4.0. If we then look at the likelihood of us falling in the first instance, you would have to say this was high too. Going back to the matrix, we have another rating of 4.0, giving an overall rating of 16.0 and a high risk factor.

While it may be difficult to reduce the severity by much, we are going to have to put procedures in place to limit the likelihood of a fall occurring.

So if we originally planned to view a roof from a tower scaffold erected by the contractor, where the likelihood of falling was high, were we instead to use, say, an access platform with an experienced operator, and were harnessed correctly and stayed inside the cradle, then clearly the risk would be reduced. The likelihood, it could be argued, is now low ,and we have reduced the risk to an acceptable level, so we can undertake the task.

We have to go through this process for every hazard that we think we will encounter on our visit – such as asbestos, moving vehicles or vermin – to enable us to complete our pre-site assessment of risk successfully.

To carry out our roles as building surveyors safely, undertaking a pre-site inspection risk assessment should be second nature to us all. The completed risk assessment should be in the job folder before we leave. But how many of us are guilty of not completing the assessment before heading out?

Table 1

Risk matrix

LIKELIHOOD	SEVERITY				
	Very high 5.00	High 4.00	Medium 3.00	Low 2.00	Very low 1.00
Very high 5.00	25.00	20.00	15.00	10.00	5.00
High 4.00	20.00	16.00	12.00	8.00	4.00
Medium 3.00	15.00	12.00	9.00	6.00	3.00
Low 2.00	10.00	8.00	6.00	4.00	2.00
Very low 1.00	5.00	4.00	3.00	2.00	1.00

Risk ranking		
High risk	> 10	Review risk in detail and amend project strategy to reduce it
Medium risk	5–10	Develop contingency plans and monitor risk development
Low risk	< 5	Maintain a record of risk and consider contingency measures in outline

Table source: Lambert Smith Hampton

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Related competencies include **Health and safety**

Phil Southgate explains the background to the forthcoming RICS guidance note *BIM for building surveyors*

Modelling is the norm

Building surveying is a diverse profession that demands a wide skill set. A building surveyor can be involved in many different construction projects, with roles varying from technical assurance to designing and managing works.

Level 2 building information modelling (BIM) was mandated in April for construction projects procured by central government departments. But if Level 2 BIM does offer the promised benefits, the relative narrowness of this mandate is irrelevant.

Building surveyors should be aware that it is worth embracing Level 2 BIM. The breadth of your service offering and capabilities means you have the most to gain. The new RICS guidance note *BIM for building surveyors* will help you on your way.

Various definitions

Perhaps the first distinction to grasp is the one between Level 2 BIM and a model – unfortunately, we tend to talk about them as though they are one and the same, which is confusing.
In fact, the BSI and Construction Industry Council guidance documents refer variously to a model, an information model, a project information model and building information modelling. From the various definitions, though, we can conclude that:

- **building information modelling** is the process of designing, constructing, operating a building or infrastructure asset using electronic object-oriented information
- **a model** is a digital, object-oriented representation of a built asset (in part or in full)
- **a project information model** is all the documentation, models and data needed to design and construct an asset.

So when we talk about Level 2 BIM, what we mean is defined, managed processes covering the creation, use and application of models and their data, plus the extra information needed to create an accurate, reliable project information model.

The processes themselves can be simple or complex, but the point is to ensure that design and construction data is:

- produced at the right time to support decision-making
- produced in an appropriate format, shared and accessible to those people who need to access it
- can be used efficiently.

The processes are based on the principle of collaboration and managed data and information sharing.

If Level 2 BIM requirements are clearly defined by the client and the processes are implemented effectively, then the result should be a predictable, achievable construction project supported by a structured record of the data needed to maintain and operate the completed asset.

It sounds simple. Of course, the starting point is the defined criteria for Level 2 BIM set out in a document called the employer's information requirements (EIRs). In your role you might find that your client needs help drafting this, so you must be aware of content requirements, how these will be expressed in the contract document, what parties the document is relevant to and what you might expect to see in response to it.

The *BIM for building surveyors* guidance note will take you through this. It will likewise tell you about the required response to the EIRs, which is the BIM execution plan (BEP). Take note of this too – you may need to submit, contribute to or even coordinate a project BEP. So the EIRs cover what the client wants from project data and information, and the BEP covers how you as the surveyor will provide the client with this. A further aspect of Level 2 BIM is the protocol, the document that captures the EIRs as an appointment or contract requirement.

There are three other pieces to Level 2 BIM to think about:

1. having a means of storing and retrieving project data and files so that they are available to those who need to access them, which is referred to as the "common data environment"
2. the extent of modelling to be undertaken
3. the scope and content of the asset data to be collected.

The EIRs should to an extent give direction on each of these, but whatever your particular role it is possible that you will be:

- saving to and/or accessing files and data from the common data environment
- producing, receiving and/or working with models and the data in them
- contributing to the asset data to be provided.

This is a swift run though Level 2, and the note will fill the gaps.

Conclusion

You could say, on one hand, Level 2 BIM is little more than defined common sense. On the other, you can see the way in which it is heading: quietly but firmly towards a data-oriented industry where modelling is the norm, collaboration and transparency are vital and software and systems are embraced. After the initial pain, these things will make our lives easier.

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RICS *BIM for building surveyors* guidance note is due be published later in 2016. See also *Building Surveying Journal* March/April, pp.16–17, on the progress of BIM in the UK.

Related competencies include
BIM, Team working

Realigning the built environment

Conversion and adaptation are essential to keeping pace with a dynamic real estate market, argue **Dr Kevin Muldoon-Smith** and **Dr Paul Greenhalgh**

As building obsolescence and depreciation become more common, building surveyors must consider adaptation within a use or between different uses with greater frequency.

Commercial real estate markets are not uniform; instead they have distinctive locations, traits and rhythms of change. Occupier requirements are dynamic and increasingly short-term, where as physical development lags these, being sluggish and illiquid.

In recent decades, authors such as John Henneberry and Richard Barras have argued that this situation is reflected in the enduring tension between the fixed nature of the urban built environment and the relative fluidity of the socio-economic processes that it accommodates.

Ultimately, commercial real estate is a derived demand, so land and buildings must adapt to contemporary needs or they will become obsolescent, depreciate in value and eventually fall vacant and derelict. Viewed this way, commercial real estate is not a rigid construction but a temporary manifestation of human activity.

This somewhat abstract conversation may seem a million miles away from your daily work, but it should be a principal concern for all practising surveyors.

Inefficiency in the urban built environment is hiding in plain sight in every town and city centre. How many commercial buildings are fully occupied and used to their maximum potential? How many retail buildings are active above the ground floor, and how many offices use all their available space productively?

Frequency of obsolescence

Many practising building surveyors may well view our call for greater engagement in building adaptation with some disdain, especially as they are already likely to be involved with the opportunities and challenges this presents on a daily basis.

Indeed, adaptation of buildings and the wider urban environment is not a new phenomenon; ever since the first building was constructed, the next thought has been what we can do to better align our built environment with developing user requirements. But what is new is the increasing frequency of commercial building obsolescence and depreciation as a result of new technology, changing working practices and societal norms.

Consequently, adaptation has become increasingly common. In recent years in the USA, the New York High Line has become the poster child for adaptation in the built environment, spawning similar projects all over the world when it was converted from obsolete transport infrastructure into a linear public park (see images 1 and 2).

In the early 2000s in Newcastle in the UK, the mixed-use residential and leisure development 55 Degrees North showcased the successful re-use of an obsolete office building in the middle of a roundabout with a motorway running underneath it (see image 3). More recently, a long-disused sweet manufacturing plant in the same city has been transformed into an award-winning serviced office facility for the digital and creative industries, the Toffee Factory (see images 4 and 5). Encouragingly, there are now outstanding examples such as this throughout the UK (*www.rics.org/uk/training-events/awards*).

The end of the office

Following the opening of the Frank Gehry-designed Facebook headquarters in California, US architect Marc Kushner heralded the end of the office, arguing that social media is changing the way we consume the urban built environment. This statement is not necessarily as hyperbolic as it may first appear, because technology is increasingly pervasive.

It is therefore credible that in the near future we could work everywhere and anywhere. Consequently, large office floorplates and the investment certainty of the medium-to-long-term lease are increasingly redundant. In response, office landlords and investors are looking to switch their capital into alternative, more profitable forms of building use.


1


2

Research into adaptation has been conducted in both the Netherlands, by Hilde Remoy, and Australia, by Craig Langston and Sara Wilkinson (*http://bit.ly/23uL3DX*). However, research into mature office market locations is rare. We have to go back to the work of David Kincaid at University College London in the mid-1990s for the only real exploration of this issue in the UK (*http://bit.ly/21NtkIJ*).

Making good this deficit in knowledge, research conducted by the Department of Architecture and Built Environment at Northumbria University has identified nearly 15,000 vacant office properties in the UK based on a sample of 27 locations, equivalent to 29 million sq. ft or 2.7 million sq. m of floorspace and £325 million in lost rent. Some 90% of this stock was secondary and predominantly built in the pre-war period (34%) and during the 1960s and 1970s (37%).

1 New York High Line before and 2 after adaptation into a linear public park

3 Mixed-use redevelopment of the 55 Degrees North building in Newcastle

4 The Toffee Factory in Newcastle has been transformed into 5 a digital and creative office space

Traditionally, the decision to refurbish, adapt (often into a new use) or redevelop was consistent with the 25-year lease that in turn afforded a certain degree of security. However, we now face a situation where conveyance takes place more regularly – two- to five-year lease structures are more common and buildings are regularly obsolete in functional and economic terms before the expiration of their physical potential.

Legislation

Recognising this situation, the government has begun to legislate. In 2013, the coalition government introduced permitted development rights (PDRs) for office-to-residential use conversion, which were later made permanent by the Conservative government in 2016.

This has had a significant impact in central London although less so further north, because in many locations outside the capital potential rent is not high enough to justify the cost of building intervention. In these locations, the less well-known Business Premises Renovation Allowance (BPRA) has had more influence in reducing the cost of conversion into alternative uses in eligible areas. (For information on the UK Assisted Areas that the BPRA supports, visit *http://bit.ly/1ml2KS4*).

The BPRA has in fact had more effect on the hotel sector as housing re-use is precluded under the scheme. While the true impact of both PDR and BPRA is unclear – for instance, gaining prior approval for conversion into residential use under PDR indicates intent to convert rather than the commencement of works – what can be identified with confidence is the increased interest in building adaptation as a viable means of creating an enhanced rate of return for landlords, developers and investors.

Feasibility investigation

Consequently, while there might not have been as much office-to-residential conversion activity as some of the more hysterical estimates in the media suggest, there has been a great deal of feasibility investigation conducted into the potential for adaptation.

This indicates that the requirements, certainties and norms of traditional redevelopment activity do not exist in an adaptation project; instead, uncertainty, risk and preliminary valuation become the norm as projects unfold.

Research participants, including representatives from the investment, agency, building management, design and public sectors, indicate that the skills and experience needed to carry out this work are in short supply, and are further undermined by market practices that assume new buildings will remain in the same use in perpetuity. In response, the consensus has been that adaptation must be embedded in both further and higher education as well as in continuing professional development.

To this end, undergraduate students on the BSc (Hons) Building Surveying at Northumbria University encounter the complex requirements and trade-offs involved in adaptation during their final year Design and Construction Economics module. This gives them an opportunity to work on an obsolete building and consider its potential future uses.

The students are organised into companies and encouraged to consider the entire building lifecycle, to develop an understanding of commercial and economic viability alongside the complications of working with existing building conditions. At the same time, they get involved with some of the beneficial consequences of new technology, such as building information modelling, 3D visualisation and laser scanning to examine the potential impact of adaptation.

Embodied carbon

In time, as operational carbon is less of an issue due to the success of energy management processes, embodied carbon will form a greater part of a building's carbon footprint. Therefore, there will be even more onus on preserving the energy held in the built environment and this means finding ways to continue using the buildings we already have.

It seems prudent to suggest that building adaptation is here to stay and will form an ever greater part of development activity. It also seems appropriate to suggest that we will need to continue to educate future building surveyors with the appropriate skills and the lateral thinking needed for adaptation.

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Related competencies include
Design, Economics and cost planning, Sustainability

Images © Iwan Baan, courtesy Friends of the High Line; Kevin Muldoon-Smith; The Toffee Factory, Newcastle

The built environment needs to adapt to the rising challenge of water, as **Richard Coutts** explains

Living with water

Water has always shaped our built environment and will continue to do so. We depend on it; we use it; we live with it; and, consequently, we must also respect it.

In both its absence and abundance – drought and flooding – water will pose one of the most serious challenges to society in the 21st century and beyond. However, it can, through considered design, be used to create beautiful and resilient cities.

This winter, the failure of recently constructed UK flood defences in northern England was exposed during floods in Cumbria and Yorkshire. Combined with a higher frequency of storm events over the last decade, this has contributed to a growing realisation of the uncertainty around weather patterns and an awareness that reliance on traditional flood defences alone is not working.

With Environment Agency Deputy Chief Executive David Rooke asking for a "complete rethink", it is timely that *Aquatecture: Buildings and cities designed to live and work with water* by myself and Robert Barker was published by RIBA in January (*http://bit.ly/1xSCnte*).

Fundamentally, 'aquatecture' seeks to make space for water in developments rather than trying to keep it out. The book illustrates how this is being done with examples from around the world, as well as providing examples of the opportunities that water can offer.

It is intended as a non-technical introduction to designing with water for policy-makers and professionals, based on an updated version of our Long-term Initiatives for Flood-risk Environments (LifE) Project, and the findings of complementary research undertaken for the Environment Agency, Technology Strategy Board and World Bank.

Figure 1
The LifE approach

It also introduces the reader to a range of new techniques that rethink the way we tackle water through design and planning, such as flood-resilient and amphibious building, zero-carbon development, sustainable urban drainage systems (SuDS) and new methods of waterfront design.

The book is organised into four disciplines – infrastructure, landscape, planning and aquatecture – that are explored individually then brought together in case studies at the scales of region, city, neighbourhood and building.

The LifE approach

In 2005, we established the LifE Project, an integrated design approach to planning and building that seeks to reduce flood risk through sustainable design. It adopts a non-defensive approach to flood risk management, promotes the creation of space for water, and upholds the highest environmental design standards.

New developments built according to the LifE principles would reduce overall flood risk, help to mitigate the effects of climate change and deliver high-quality, sustainable and resilient settlements. The LifE Project received UK government funding through the Department for the Environment, Food and Rural Affairs Innovation Fund in 2007. An expert team sought to establish and test the LifE principles by masterplanning three sites in the UK, although the principles are transferable to other countries.

Fundamental to the approach is a shift from traditional flood prevention towards a less defensive approach. Space is made to store water, and for water to flow through predetermined parts of settlements without significant disruption to people. The space between buildings, which is designed to flood, could provide other functions when not flooded, such as recreation or energy generation, in a multifunctional way that demonstrates integrated planning.

The approach is based on three essential considerations:

- **development pressure** – the need to build and support a growing and ageing population, and the need to improve all development to ensure better living conditions and wellbeing
- **environmental change** – caused by both human-induced and natural processes, including pollution, habitat destruction, overextraction of fresh water, land degradation and climate change
- **increased risk of flooding** – more frequent and more severe flood events that affect a greater number of people and businesses.

The proposed response is illustrated by three intersecting approaches that incorporate the LifE principles:

- **making space for water** – working with natural processes to provide space for water (rain, rivers and sea) to expand during times of flood, reducing reliance on flood defences
- **living with water** – developing communities that are designed to anticipate, cope with and recover quickly from flooding, with little or no impact on their daily lives
- **eco-design** – harnessing natural resources to create low-energy developments that have a positive impact on the environment and seek to reduce carbon emissions.

At the centre of the Venn diagram (see Figure 1), the principles converge in an holistic approach, integrating planning, architecture, landscape and engineering to create multifunctional spaces and buildings and provide storm and floodwater attenuation when necessary.

These principles underpin the design philosophies of the architecture, masterplans, and landscape and engineering solutions used in aquatecture. They are illustrated at a range of scales through case studies

The UK's first amphibious house in Buckinghamshire

Nijmegen, the Netherlands: aerial view of the relief channel

that show how the LifE approach may be applied to create resilient communities.

Aquatecture

Individual properties may require flood protection where it is not possible to reduce the risk of flooding through planning or landscaping measures alone, or where there is a residual risk. Historic buildings or key buildings such as hospitals, communication hubs or safe havens may also need protection.

Five main approaches to tackling flood risk at building scale have been identified.

1. **Flood avoidance:** this approach works by locating buildings away from flood risk areas or lifting buildings above the water level on stilts or raised land.
2. **Flood resistance:** also known as dry-proofing or water exclusion strategy, this approach seeks to keep water outside the building by blocking ways for the water to enter and providing a water-resistant building fabric.
3. **Flood resilience:** also known as wet-proofing and water entry strategy, this approach allows the water into a building in a controlled way and relies on the use of internal water-resilient materials and detailing to prevent permanent damage and allow quick recovery after a flood.
4. **Floating:** this approach works by permanently floating the building on water, enabling it to move up and down with the floodwater and preventing people and property from being flooded.
5. **Amphibious:** With this approach, also known as can-float, the building is fixed to a buoyant base that rests on the ground but is designed to float when floodwaters rise, temporarily creating a floating structure (see photo, top, and also *Building Control Journal* November–December 2015, p.10).

Dutch project

In 1993, heavy rainfall led to flooding in Limburg in the South East of the Netherlands. In 1995, water in the Dutch river and dyke system rose to such alarming levels that a quarter of a million people were evacuated from their homes. This close call led to a shift in approach, from holding out water through defensive means to acknowledging that space for water was needed; thus, the Room for the River project was born.

The Dutch government identified that the discharge capacity of the river system had to be increased to cope with heavier discharges than previously anticipated, in response to climate change. This needed both a national and regional approach, in particular in the Maas/Rhine river deltas – IJssel, Waal and Nederrijn. It also involved 17 partners, including Rijkswaterstaat, the Dutch Department for Public Works and Water Management.

The Room for the River project involves a range of measures, including relocating dykes, lowering floodplains, enlarging the river channel, removing obstacles to flow such as groynes or bridge supports, and flood-relief channels.

Although these approaches require considerable engineering, another, overarching objective was to improve the environmental quality of the river system.

One of the key projects is located on the River Waal between Nijmegen and Lent (see photo, left). Nijmegen is located on a pinch point in the river, approximately 17km downstream of Germany; it will see a €365m new flood-relief channel and dyke installed to reduce the risk of flooding regionally and help support the redevelopment of Lent.

Baca Architects was engaged to provide landscape and development ideas for the island created by the new waterway. The proposals for an eco-tourism destination embrace both the water and the landscape with recreation facilities and innovative flood-proof buildings on the waterfront.

This major engineering project has been the catalyst for new homes, transport improvements and landscaping; this benefits the city and wider region, as well as the local environment. By considering the potential broader benefits from the start of the project, a more integrated solution has been found rather than just a cost-driven one.

This shows that managing increased flood risk can simultaneously help reduce pressure for development and provide environmental benefits. Construction on the flood relief channel began in 2013 and is due for completion this year.

As first the motor car and then health and wellbeing transformed 20th-century town planning, in the 21st century it will be water that shapes our communities. Unless we begin to address the effects of flooding and drought now, the consequences are likely to worsen over the coming century. Aquatecture offers an alternative approach to traditional flood defence-based solutions in an accessible way, and highlights opportunities for innovation across the construction sector.

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Tenants spring into action

Emma Humphreys provides an overview of recent dilapidations rulings

Court decisions on disrepair in recent months have, somewhat unusually, focused almost entirely on examining residential landlords' obligations rather than those of tenants. However, these have led to some useful clarifications of the law that can be applied more widely.

Defective premises

Most recently, Sternbaum v Dhesi [2016] EWCA Civ 155 confirmed the law relating to defective premises, after a tenant sued for an injury caused by falling on a staircase that had no banister.

Although the banister had never been present during her tenancy, the tenant argued that the landlord was responsible for addressing this on the basis of its lease covenant "to keep in repair the structure and exterior of the premises". She contended that there had also been a resulting breach of the landlord's duty of care owed under section 4 of the Defective Premises Act 1972, which arises where a landlord commits to maintain or repair premises.

While it accepted that the staircase was a hazard without a banister, the Court of Appeal felt unable to conclude that it was "in disrepair". It therefore agreed with the landlord that requiring him to install a banister would equate to imposing an obligation to improve or make safe the premises, and that this went beyond the obligations he had to repair and maintain the premises.

Aside from the helpful confirmation, this decision also illustrates the importance of assessing a case on its own facts. The tenant in Sternbaum may have expected to win on the basis that a landlord had been held responsible for an injury arising from the tenant's removal of a banister in Hannon v Hillingdon Homes Limited [2012] EWHC 1437. However, the banister in Hannon had been part of the structure for the purposes of the 1972 act, whereas the court in Sternbaum found that the structure of the premises at the date of the lease was unlikely to have included the missing banister.

Damages without occupation

Moving on to the issue of damages for breaches of landlords' repair obligations, there was good news for tenants from the Court of Appeal in Mansing Moorjani v Durban Estates Limited [2015] EWCA Civ 1252. Here, the tenant was awarded damages in respect of the landlord's failure to maintain and repair the common parts of his block of flats, even though the tenant was not then occupying the premises, for reasons unconnected to the disrepair.

The key question here was whether the temporary loss resulting from the landlord's breaches lay "in the impairment in the amenity value of the lessee's proprietary interest in the flat, for which he has paid rent or a premium, or in the experience of discomfort, inconvenience and distress which the lessee actually suffers because of the disrepair". In the event of the latter finding, non-occupation by the tenant was likely to reduce the damages significantly.

The court concluded that the loss lay in the impairment of the tenant's enjoyment of his property rights, of which discomfort, inconvenience and distress were only symptoms. The tenant's decision to live elsewhere for reasons unrelated to the state of his flat was therefore not fatal to his damages claim. However, the court noted that the extent of a tenant's use of a property was not entirely irrelevant to the exercise of assessing damages.

When assessing the appropriate level of damages in Moorjani, the Court of Appeal used the market rental value of the flat as a starting point. That value was then reduced significantly to reflect the fact that the common parts were in no more than cosmetic disrepair. There was also a deduction to reflect the tenant's lack of occupation. At the time of writing, a decision is awaited from the Supreme Court as to whether permission to appeal will be granted to the tenant in respect of certain points on which he was unsuccessful.

Costs recovery

There was also an interesting decision on recovering costs in Fairbairn v Etal Court Maintenance Limited [2015] UKUT 639. Here, a tenant challenged her landlord's decision to include in her service charge the settlement and costs it had paid to a neighbouring tenant who had enforced the landlord's obligations to repair the premises. The tribunal disagreed with the landlord that these sums were incurred for the proper management, administration and maintenance of the flats; they had resulted from the landlord's failure to comply with this obligation and were therefore inappropriate for recovery via the service charge.

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Related competencies include
Legal/regulatory compliance, Conflict avoidance, management and dispute resolution procedures

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Christopher Sullivan discusses alternative ways of resolving dilapidations disputes

Determination gets you through

Most dilapidations claims fortunately never reach the courtroom, but when matters do escalate, the best outcome for both parties is a quick resolution at minimum cost. However, traditional litigation is a slow process and certainly not a cheap one; indeed, it is not unknown for the costs to outweigh the value of the claim.

Litigation might feel like the natural way forward when a dilapidations dispute escalates. Very often, though, the issues at the heart of such disputes are highly technical, making them ideally suited to alternative dispute resolution (ADR).

The Civil Procedure Rules, which regulate all proceedings in the civil courts, actively encourage parties to try to resolve their disputes without recourse to litigation. They must also consider the use of ADR before embarking on major legal proceedings.

Both the Dilapidations Protocol (*http://bit.ly/1To8NJd*) and the RICS *Dilapidations* 6th edition guidance note (*http://bit.ly/1sjLSmE*) likewise encourage the use of ADR. Recent judgments have also seen heavy costs penalties imposed for a failure by parties to give reasonable consideration to using ADR.

RICS is very much committed to promoting ADR. Indeed, for many years, the RICS' Dilapidations Dispute Resolution Scheme (DRS) has been able to appoint both arbitrators and experts on dilapidations disputes (*http://bit.ly/1BDJMvQ*). Due to market demand, it went a step further last year by training and accrediting a panel of experts especially for the scheme. These are building surveyors who have at least 10 years' relevant specialist experience after qualification; all have completed a demanding, RICS-accredited training course and have been successful at a selection interview.

Independent experts

An independent expert is appointed by the parties to provide a neutral

assessment of the claim and intervention is usually set to commence at a fixed time after lease expiry. Following instruction, the expert will first provide a non-binding assessment of the contractual claim and the parties will then have a set period, typically 15 days, to consider this, during which time they may attempt to settle the matter between themselves. Should an agreement not be reached within this time, the expert will produce a final, binding determination.

The expert's decision can be delivered in as little as three months. It will combine the results of their investigation with an assessment of any evidence and representations submitted by the parties, the opinion of other specialists such as mechanics, engineers and cladding consultants appointed by the independent expert, plus, ultimately, the application of their personal expertise.

The process also involves the production of an impartial and binding assessment of the diminution in value of the landlord's reversionary interest, capping the claim in accordance with the provisions of section 18 of the Landlord and Tenant Act 1927.

Determination clause

The inclusion of an independent expert determination clause in relation to rent review lease procedures has been around for decades, and now there is considerable interest in similar lease provision as regards dilapidations disputes. Recognising this, the RICS working party on dilapidations ADR is developing a standard lease clause that will be soon be available for download from the DRS website.

Such a clause is welcomed, particularly as there are a number of factors that may well prompt an increase in the number of disputed dilapidations claims in the coming years.

- **Shorter leases:** the average lease term is just over five years, and shorter turnarounds mean more claims.
- **Upward property cycle:** landlords will progressively look to improve their buildings to make them more marketable – but who pays for this?
- **CFCs in air conditioning:** the market is demanding new, non-CFC systems, even where the originals still work effectively. Again, who pays?
- **Minimum energy efficiency standards:** whose liability is the upgrading of inefficient buildings?

Advice

Cheaper, faster and more flexible than traditional litigation, the benefits of expert determination are clear; but your clients may not be aware of the RICS dispute resolution route.

All surveyors involved in a dilapidations disputes are strongly encouraged to embrace the scheme, particularly where the dispute appears fractious from the beginning and may seem to be on the way to the courtroom.

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Related competencies include
Conflict avoidance, management and dispute resolution procedures

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Protection matters

Richard Nicholson discusses how to go about working on trees that are subject to preservation orders

A tree preservation order (TPO) can be issued by a local planning authority to protect individual trees, groups of trees or woodlands in the interests of public amenity. It takes the form of a legal document that includes a plan showing the location of the trees and a schedule that describes those protected.

TPOs date from the first Town and Country Planning Act 1947 and some authorities still have orders in place from the early 1950s, so the documentation comes in all shapes and sizes. In April 2012, however, the government published new regulations cancelling the provisions in TPOs issued before 6 April 2012 and replaced them with the provisions of the same year's Town and Country Planning (Tree Preservation)(England) Regulations (*http://bit.ly/1PRZscf*).

The only parts of a TPO from before this date that remain in effect are its name, its endorsement and the details, by way of the plan and the schedule, of the trees protected. The Welsh Assembly decided not to adopt the 2012 regulations, though, retaining TPO documentation that dates from different periods.

A TPO can protect anything that can ordinarily be described as a tree and is listed in the schedule. This is why surveyors must take the trouble to look at the plan and the schedule.

Consider a property that has an oak in the front garden and a willow and a maple in the rear garden. The property has a TPO on it and the schedule lists a T1 oak as growing in the front garden and a T2 elm in the rear. There are two circles on the plan labelled T1 and T2 showing the position of the trees.

Clearly the elm has long since died, probably from Dutch elm disease, but the oak is still growing. While there may be more than one TPO on the property, if the council record shows only one then the maple and the willow are not protected.

> “Be aware that a tree preservation order frequently contains more than one tree, can cover more than one property and can contain more than one classification

Some TPOs protect individual trees, shown as a circle and labelled T1, T2 and so on; some protect groups of trees, shown as a polygon edged with a dashed line and labelled G1, G2, etc. An “area” classification is shown as a polygon edged with a dotted line and labelled A1, A2 and the like, while a “woodland” classification is shown as a polygon edged with a solid line and labelled W1, W2 and so on.

In every case, however, the protected trees will be detailed in the schedule. Be aware that a TPO frequently contains more than one tree, can cover more than one property and can contain more than one classification.

If the local planning authority issues a TPO on a property, the owner has the right to object before the TPO is confirmed. They will receive guidance on this from the authority in the bundle of documents served on them, and their objections are heard by that authority.

Should the TPO be confirmed against the owner's wishes, their best course of action is to make an application for works under the new TPO and appeal to the Secretary of State. The good news is that there is no fee or any other charge for TPO applications, notifications or appeals.

Application

Should you wish to carry out work on a tree that is the subject of a TPO, you

1 Roadside oak trees implicated in subsidence event

2 One oak established as cause of subsidence is subsequently felled

will need to apply to the relevant local planning authority. To do this, you should download and complete a tree work application form from either the online Planning Portal or the local authority's own website.

Guidance notes attached to the form state that, where the reason for the work concerns alleged damage to a structure, a higher level of evidence must be submitted to demonstrate that the tree is a material cause of the problem, and that other potential causes have been eliminated so far as is possible.

Subsidence cases often involve information outside the expertise of the authority's arboriculturists. Authorities use engineers and building control officers for advice and employ consultants where the tree in question is of significant amenity value. The list of information required for the 1App tree work application form in these cases is mandatory, and an authority can refuse to determine an application without it.

Proving a tree to be the cause of subsidence can be difficult, but as a minimum authorities will need root identification from live samples below the seat of damage, evidence of a shrinkable clay subsoil and level monitoring that demonstrates seasonal movement.

In determining any application for tree work, the authority must balance the public amenity that the tree offers against the reasons provided for requiring the work. The authority has to consider, in the light of its assessment and the submitted evidence, whether the proposal is justified. It follows that the more drastic the nature of the proposed work – felling, for example – the better the reasons provided for it should be.

If the local authority grants consent for the work, usually with conditions about the standard required, an applicant can carry this out within two years of the date of the decision. Should the authority refuse, however, it will include with its paperwork details of how to appeal the decision to the Secretary of State through the Planning Inspectorate.

Not all works require consent. There are exemptions in the regulations that permit works on dead trees and branches, and on trees and branches that present an immediate risk of serious harm. Other exemptions are listed in the regulations; if in doubt, the authority should be approached.

Where a tree is protected, it is an offence to cut down, remove the top from, cut branches off, uproot or wilfully damage or destroy the tree. The local authority can pursue enforcement action in the case of unauthorised tree work, and fines can be imposed on the tree owner or the person instructing or carrying out the work where an offence has been established.

Conservation areas

Trees growing in conservation areas are automatically protected where they have a stem that exceeds 75mm in diameter, measured at 1.5m above ground level. The offences and exemptions contained in conservation area legislation are not dissimilar to those in TPOs; the significant difference is that when an applicant wants to work on a tree growing in a conservation area that is not also subject to a TPO, they need to notify the authority of their intentions rather than apply for consent, though they do not have to provide so much information as they would under a preservation order.

While there is no requirement to use a 1App form, it is probably easier to do so. The local authority has six weeks to respond, and may take one of two courses of action: either allow the works to proceed, or issue a TPO that prohibits the work from taking place. If it allows the works, then it will usually respond to the application, although should the applicant hear nothing they can go ahead six weeks after notifying the authority.

An important part of the *Planning Practice Guidance Tree Preservation Orders and trees in conservation areas* document is that it contains endorsements showing that the TPO has been confirmed. If the TPO is more than six months old and has not been confirmed then it will have no effect (*http://bit.ly/1LqnJx6*).

Finally, a TPO will generally only protect trees that were growing at the time it was issued. There are a couple of exceptions: a TPO with a "woodland" classification covers trees of any age, including saplings, and there might also be occasions where a tree has been planted as a replacement for one that died or was removed in contravention of the TPO. The arboriculturist in the local authority's planning department should be able to help with this information.

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Related competencies include **Legal/regulatory compliance, Conservation and restoration**

OPINION

Alex Charlesworth explains why it is vital to recruit a new generation of building surveyors

Drawing new blood

Not enough young people really know or understand what chartered surveyors do, let alone the role played by building surveyors. We have to spread the word that building surveying is a fantastic profession to be in – to shout loudly about what we do and where we add value.

We need to inspire a new, more diverse generation to become building surveyors: this was my rallying cry when I introduced last year's RICS Building Surveying Conference. One year later, I can report that the Building Surveying Professional Group Board (BSPGB) has a strategy and a plan, and is implementing it.

There are two clearly defined issues here. While recruitment is essential, promoting an understanding of building surveying is still more important. Get the latter right, and the former will follow – with the added benefit that a higher proportion of the population will understand more about our role in real estate. The BSPGB should identify issues and find ways for all members to help raise our profile.

Poor diversity record

RICS research has shown that building surveying is not alone in facing a recruitment crisis. Above all, two facts stand out from this research:

- 50% of members are aged over 50
- a mere 13% of members are female.

Our diversity record is very poor, and we must include age as a factor in this as well. While planning a strategy for recruitment, we must ensure that we also focus on fostering greater diversity in our profession.

There are many misconceptions about building surveying, which may be seen as barriers. We must show the variety of work we do and services we provide, as well as the different types of careers available in building surveying. In short, we must appear more inclusive.

Attracting students

Growth in membership relies on attracting young people to study building surveying. Although we are currently in a buoyant market with a very high graduate employment rate and the number of applications for building surveying courses is high, students graduating in three years' time may be less fortunate if the market has turned by then. This was the case in 2009 and 2010, when many students found it difficult to secure employment. As a result, some decided to leave the profession altogether.

There is no easy answer to this problem, but various schemes currently available include apprenticeships, day-release degrees and conversion courses, which may go some way to keeping the flow of students into the profession high. However, we must also attract back those who have left.

It is also worth noting that universities face a great deal of pressure to provide technical courses, such as building surveying, on limited budgets. Surveying requires a number of lecturers from different professional backgrounds, particularly compared with courses such as business studies, which have fewer lecturers and considerably more students. Simple economics shows the pressure that some universities are facing, and if the level of applications falls, at what point does it become uneconomical to run courses?

Raising the profile

The other main issue we face is the lack of understanding about what chartered surveying is. This is sadly the case with people of all ages, but is of most concern at primary and secondary school age, when pupils are thinking about career choices.

A few years ago, dedicated careers advisors had central repositories of information into which RICS could feed details of our profession. This is no longer the case, however, and 29,000 schools throughout the UK no longer have such central resources, so have to rely on the knowledge of teachers who are nominated careers

Image © Shutterstock

advisors as well. As a result, building surveying is now a small paragraph in a careers book along with thousands of other potential vocations.

Targeting so many schools individually is just not possible. Unless we promote building surveying as a profession in schools, applications to universities and courses available will fall, resulting in a smaller rather than growing number of new members.

The BSPGB is focusing on a new marketing direction. With developments in technology, there is less reliance on careers books and more reliance on the internet, and websites such as Plotr (*www.plotr.co.uk*) let students enter their personality traits, likes and dislikes and receive career recommendations based on these.

We are working hard with the RICS to ensure that we are represented in a way that makes careers in building surveying attractive, ensuring that we are represented on such websites and apps.

Studies show that millennials spend more than two hours a day on mobile phones and tablets. Being millennial-friendly is of huge importance, and embracing mobile technology may be the deciding factor in attracting young talent to our profession. The bottom line is that if we are not using technology to get our message across, we are unlikely to be in the running when career choices are made.

Films and literature

We are also working with RICS to make short films about our careers and where we provide added value to the real estate sector. Practical applications with simple explanations will offer a greater understanding of the profession. The aim is to create a collection of short films available to members to help promote our work.

We are not just targeting young people looking to make career choices, but to promote understanding about the role we play in real estate among the wider population. This is in addition to our existing marketing material, which will be revised to target schools, universities and clients. Promoting building surveying as a career of choice will not just increase our membership – it will also provide a future generation of clients with a greater understanding of what our profession does.

The BSPGB and RICS are clearly alive to the twin issues of recruitment and raising our profile, and we must embrace new technologies and make changes to our approach to achieve these.

However, we have a business plan and a strategy, and are already taking action. We will provide the tools and direction, but all members must take on the responsibility of shouting more loudly about our profession.

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If you have any thoughts about RICS' future talent strategy please contact Sally Speed at **sspeed@rics.org**

A healthy interest

The health and safety competency is mandatory for building surveying. **Ewan Craig**, a speaker at the RICS annual It's Your APC conference, offers guidance on the subject

Health and safety is one of the mandatory competencies for the building surveying APC. In the construction sector, this demands a good ability to apply technical competencies together, for example:

- building pathology: how the building has, or is prone to, deterioration and how this may affect the health and safety of occupants or visitors
- design and specification: the process of construction, good health and safety practice, and mitigating or avoiding potential poor practice
- legal/regulatory compliance: legislation and regulations on health and safety such as the Construction (Design and Management) Regulations, also referred to as the CDM Regulations.

The levels

The requirements for this competency by level are as follows.

At level 1

Demonstrate knowledge and understanding of the principles and responsibilities imposed by law, codes of practice and other regulations appropriate to your area of practice.

At level 2

Apply evidence of practical application of health and safety issues and the requirements for compliance in your area of practice.

At level 3

Provide evidence of reasoned advice given to clients and others on all aspects on health and safety.

> "You should be familiar with the health and safety issues raised in your documents

You should be familiar with the health and safety issues raised in your submission documents, and be ready to address questions on them and matters related to them.

Questions

Actual questions are based on the candidate's experience, which should be at level 2 but could exceed this. Two examples are given below.

Can you please explain how you addressed the health and safety issues prior to construction in refurbishing building X?

This question is aimed at level 2 candidates, but it could be extended to level 3 if you prepared reasoned advice for the client. The answer should explain pertinent issues to support your application of knowledge.

This was a sizeable project including alterations, reroofing and redecoration of a block of flats. I started to realise during the pre-construction phase that the client was unfamiliar with the construction sector and this was their first refurbishment project.

At the initial meeting, I asked about the appointment of the principal designer as the client had not appointed us, and the work indicated that the CDM Regulations would apply. When the client questioned why this was required, I mentioned the CDM Regulations and the duties these place on the client.

The client was unaware of their duties or how to fulfil them, so I gave them guidance on these and complying with them under the regulations by, for instance, appointing a principal designer and principal contractor, providing information to them and allowing adequate time for design and construction. The client did then appoint the principal designer and contractor and complied with the regulations, extending the programme to allow sufficient time to prepare before the works started.

Please describe how you dealt with the health and safety issues during the construction of building Y.

This is aimed at level 2 candidates as well. Your response should show the issues considered in applying your knowledge.

I carried out regular site inspections during the construction phase for the construction of building Y. On my initial inspection during the site set-up, I found several welfare, health and safety issues. These included inadequate wash facilities with no hot water and no provision to heat food. Both of these were expected under the CDM Regulations construction phase plan. I informed the principal contractor who rectified both issues before the facilities were used.

During an inspection with the site agent later in the project, we found workers had erected a mobile scaffold that was unstable and a competent person had not inspected it, contrary to the Work at Height Regulations. The site agent prohibited its use until it was inspected by a competent person. Following this, he provided evidence of corrective action being taken with all site operatives, as well as those concerned, such as retraining, toolbox talks on using scaffold and spot checks.

Care

Given the time constraints of the APC, your answer should be brief but comprehensive. Care should be taken to demonstrate your own skills, abilities and knowledge to the assessors.

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For details on the APC pathway guide for building surveyors, please visit **http://bit.ly/1qBVUhw**

Related competencies include **Construction technology and environmental services, Legal/regulatory compliance, Building pathology, Design and specification**

RICS

Building Conservation Journal

OPINION

Think ahead, but look back

Dr Alan Forster is Associate Professor in the School of Energy, Geoscience, Infrastructure and Society at Heriot-Watt University, Edinburgh

Historically, architectural form was closely related to local materials. Minimal transportation and the comparatively low energy taken to produce many regionally sourced materials are clearly environmentally beneficial, and these characterise many of our pre-industrial buildings.

Our historic structures are inherently resilient architectural survivors, responding effectively to social, economic and political change. It is commonly said that they were built to last, and do not conform to current, relatively low expectations for durability and notional design life. But all buildings deteriorate, including historic structures. So why are they still with us?

One significant factor is that such buildings are low in risk. In historic terms, construction design, materials and build systems evolved incrementally. As a result, the severity and impact of defects with these buildings are low, and established technologies enable easy and ongoing rectification of defects. We understand their performance deficiencies but have remedies for them, and the construction sector generally understands the rules of the materials and technologies – although it would still benefit from some investment in training.

Conversely, significant construction innovation – as seen for example during the post-war housing boom – is far more risky, because of its reliance on scientific methods and accelerated testing with limited scope. Complexity leads to uncertainty about the performance of such buildings. New materials and supporting construction technologies brought to market with limited testing pose challenges, especially if the construction sector is not geared up to use them.

Change and risk are largely inseparable. While progress is essential, it would be perverse to ignore the performance of our traditional building stock, which has almost innumerable tonnes of embodied carbon locked up in its fabric. We know such traditional buildings well and understand their weaknesses; however, we often fail to recognise their importance to society.

It is true that much of our historic built environment is under significant performance strain from climate change, and strategies are needed to enhance its resilience. But we should ask how our innovative construction methods and materials will fare over the next 200 years: will contemporary buildings survive at the same rate as Georgian and Victorian structures?

Much of my own research tries to revisit traditional materials and technologies for fabric repair or contemporary design solutions. These have been shown to have environmental benefits, represent a low risk and are highly durable when used with robust design, detailing and maintenance. Relatively low-carbon materials such as earth, lime and responsibly sourced timber help save carbon through 'fabric first' design. So there is much that can still be learnt from these materials and technologies.

CONTENTS

rics.org/journals

Ivor McElveen discusses the use of lime and the resurgence of hot-mix mortars

Time for a revival

Lime has a long history of use in building construction in the British Isles. Today, it is used more as a plasticiser to improve the workability of cement–mortar mixes and has largely been superseded by Portland cement and gypsum. However, since the 1990s, there has been a revival in its use in construction. Research programmes have proliferated, increasing understanding of its application.

Lime is produced by heating limestone in a kiln until the stone is calcined by releasing carbon dioxide, giving a residue known as quicklime, the basic constituent of all lime mortars. What follows varies by local building tradition, the desired mortar product and modern techniques.

There are several types of lime; the differences mainly depend on the geological origin of the limestone and the proportion of other minerals it contains. The two main types are non-hydraulic lime – also known as pure, fat or air lime – and hydraulic lime, which gets its name from its ability to set underwater. Hydraulic lime can broadly be separated into two groups, namely artificial (HL) and natural hydraulic lime (NHL). HLs are made from a fat lime with a hydraulically reactive component, such as pozzolan, added later. NHLs are made from limestones containing other elements, mainly silica and aluminium, and come in three grades, NHL 2, NHL 3.5 and NHL 5, corresponding roughly to their compressive strengths in N/mm^2 at 28 days, although these vary depending on the origin of the lime.

Today, hydraulic lime is mainly used in the British Isles, predominantly imported from France, Germany or Portugal. No readily available hydraulic limes are produced in England, neither are there indigenous sources in Scotland, Wales or Ireland – a worrying development when authentic like-for-like mortars are vital in historic building repairs.

Hot-Lime Mortar Project

In recent years, there has been a revival in the use of indigenous non-hydraulic limes and hot-mix mortars, primarily in a drive to replicate the mortars seen in historic masonry structures. These materials are empirically believed to have greater compatibility with original mortars. Compared to historic mortars, which are invariably a feebly hydraulic hot mix of less than 2N/mm^2, replacement NHLs were sometimes reaching strengths of over 10N/mm^2. Mortars made using hydraulic limes tend to be harder, less permeable and not as flexible as those made with non-hydraulic or air limes.

These factors can have long-term adverse consequences for historic buildings, where it is usually preferable for new mortars to be marginally weaker and more permeable than the existing ones to minimise the risk of accelerated deterioration of the masonry fabric. With the accepted conservation principle of like-for-like repairs and seeking as near a replication as possible, hot-mix mortars using indigenous non-hydraulic limes have significant appeal. However, little was known about their use as analytical research has only recently started to gain meaningful attention.

The revival of hot-mix mortars has been stimulated by research undertaken by the Building Limes Forum Ireland, which established the Hot-Lime Mortar (HLM) Project. This involved the transfer of know-how and related research between Scotland and Ireland. Scotland was chosen because it already had more than 20 years' experience in the revival of hot-mix mortars and similar geological, climatic and cultural conditions. Phase I of the project has been completed and phase II has now started.

An HLM Group comprising Historic Environment Scotland, Historic England and the Heritage Council of Ireland has been set up for phase II, cooperating on an all-islands basis. The intention is that Cadw of Wales and the Historic Environment Division of Northern Ireland will join the group to allow collaboration and innovation, avoid duplication and share procedures, research and information on hot-mix lime mortars.

Replacing cement render with replica feebly hydraulic hot-mix lime harling and lime wash at 17th-century Craigievar Castle, Alford, Aberdeenshire

Hot-mix lime mortars

For the purposes of the project, hot-mix lime mortars have been defined as those where non-hydraulic quicklime, sand and water are mixed together in one operation, often gauged with an NHL or pozzolan, making a ready-to-use mortar. This can be applied 'hot' while the lime is still slaking, or 'cold' after this process.

In the context of traditional construction, this is still the quickest, cheapest and easiest way to make a basic mortar. It is thought that as much as 90% of all mortars used in exterior applications up to the early 20th century were made using hot-mix lime mortar techniques. Therefore, its use today is more likely to replicate the original mortar.

With the modern production of quicklime in kibbled (pea) form, handling it and making mortars is more controllable

17th-century St Canice's Steps and Arch, Kilkenny, where masonry repairs and repointing of used feebly hydraulic hot-mix mortars

and convenient than in the past when it was typically supplied in 'lump' form. The kibbled form of quicklime being relatively dust-free also satisfies important health and safety considerations.

While non-hydraulic quicklime hot-mix mortars are successfully used in suitable climates, they do not necessarily have as fast or predictable a set as NHLs. They will not perform well in areas of extreme exposure or constant dampness, such as the pointing of paving or on the lower levels of bridges. However, with the addition of small quantities of NHL or a pozzolanic additive to the hot mix, their performance can be adapted to suit a wider range of conditions.

For traditional stonemasonry construction and repair, hot-mix lime mortars have been empirically found to perform better than those based on lime putty and NHLs, as is evidenced by their increased uptake. They are generally more workable, can increase productivity, and usually result in cleaner work with no runs of mortar down the face of the wall; they tend not to slump in the joint, which leaves a neater, fuller finish. There is less risk of lime leaching from the mortar, which can lead to a weaker mortar mix at the face of the work.

Practitioners have reported that HLMs allow wet stones to be laid and stabilised without subsequent movement, a common problem with most mortars that are used cold. Very wet sand can also be used without adversely affecting the final consistency of the mix, owing to the massive absorption of water by the quicklime and loss of some excess moisture due to the heat generated.

Hot-mix lime mortar design

Hot-mix lime mortars are more authentic than imported hydraulic mortars and relatively inexpensive due to the low cost of quicklime and the volume increase that occurs when it has slaked.

When using quicklime as a mortar component, it is important to recognise this volume increase: air limes typically double in volume once slaked, resulting in richer mortar mixes than the 1:3 mixes invariably specified today. Analyses of historic mortar samples have commonly found mixes in the region of two parts lime to three parts aggregate, or even richer. This appears to have been achieved by mixing one part quicklime to three parts aggregate (given the volume increase of quicklime when slaked).

Making hot-mix lime mortars

Practitioners have developed their own preferred methods for batching and mixing hot-mix lime mortars. The end use of the mortar, along with the quantities required, will often dictate the most appropriate method of preparation.

A common way of making bedding and pointing mortars for rubble masonry walls is to mix dry sand and quicklime before adding water and mixing thoroughly, adding NHL gauging or a pozzolan last; other methods are used for bricklaying mortars and renders. It is always advisable to seek professional advice and guidance in preparation and application.

Work with all types of mortar requires the user be familiar with Material Safety Data Sheets and prepare an appropriate risk assessment. Personal protection equipment should be worn at all times. The Building Limes Forum Ireland recommends that diphoterine eyewash or equivalent, be kept close to handling, storage, mixing and working areas.

Phase II of the HLM Project

Phase II involves further testing and research using pozzolans. There will be demonstration workshops and information literature, and the forum will encourage discussion and debate.

There is now a more extensive palette from which to select a specific lime mortar for an application, providing authenticity and compatibility with the original materials.

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The HLM Project
http://bit.ly/1R0f5s2

Historic Scotland's *Hot-mixed Lime Mortars*
http://bit.ly/1JGJo6Y

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Chris McCollum and **Kenny Moore** describe the technical, philosophical and practical stages involved in the conservation of an historic stone obelisk

Needle points

While an obelisk may be an unusual structure for most surveyors, the good practice, assessment techniques, technical issues and philosophical considerations applied to this project should be common to all building conservation work. So when asked by the Follies Trust to assess the damage and suggest conservation options for the Beresford Obelisk at Ballyquin near Limavady in Northern Ireland, the practice Chris McCollum Conservation Surveyors applied standard procedures to this non-standard project to ensure the best results for all concerned.

Visual inspection

The Beresford Obelisk, built in 1840, is a classically designed stone structure with a 34ft needle set on a 12ft rectangular plinth with the remains of four slate plaques, standing on two square steps.

A preliminary inspection determined the main threats to the fabric and made an initial assessment of its condition to confirm it could be conserved, identifying probable repair issues and – critically for the Follies Trust – the likely cost of repair.

A visual assessment from ground level, drawing on the surveyor's experience of working with historic structures, confirmed that the needle and steps were of local Dungiven sandstone, built in battered ashlar and moulded blocks with a core of rubble, and that the base was a mix of stone and brick, now rendered but perhaps originally of dressed stone.

The initial assessment also concluded that there was a slight stoop to the top third of the needle and localised disturbance of the higher stone sections. There was also evidence of structural cracking where vegetation was taking hold in joints in the stone

that had significantly eroded, principally associated with increased frost damage and salt crystallisation. The degree of exposure and the severity of wind-driven rain was a conducive environment for extended periods of fabric saturation.

The stooping is very characteristic of rust jacking in hidden iron cramps, which are used to pin stones together but corrode and expand, pushing up the joints at each level. Corroding metal cramps will expand to around 10 times their original size, and a slender stone structure from this period could be expected to contain many such cramps.

Many individual stones had also failed due to poor bedding techniques, in particular in some of the face bedding to ashlar elevations and edge bedding to corner stones to the needle. How a stone performs in a building depends on many issues, but how its bedding plane is laid is critical. Depending on the function of the stone, the bedding plane can be laid edge, naturally or face, and if incorrectly laid, the stone will fail prematurely.

A number of stones were dislodged and the cement-based render was failing, characteristically pulling the face off the stone below. Finally, much of the original

moulded stone had mechanical damage where it had been keyed to allow the application of cement render. Enough moulding remained to allow the original profiles to be determined.

The conclusion was that the failure at high level had been caused by driving rain increasing the rapidity of frost damage in the mortar joints. Penetrating dampness therefore occurred at depth, corroding the hidden cramps and destabilising the core by leaching the lime matrix. This subsequently meant lower stones became dislodged, while the repair using cement had removed individual stones' faces. At ground level, damage was caused by cattle rubbing the monument's corners and dislodging further stone.

Suggested repair

In broad terms, it was suggested that the repair should involve taking down and rebuilding the top section of the needle, including grouting of core to replace

1 Second tier of obelisk with original ashlar covered in cement render; the latter had failed, resulting in failure of masonry as well

2 Replacement of obelisk's apex stone.

3 The obelisk as conservation work starts and 4 once complete with the former apex stone placed at the base of the steps

the lime matrix and fines washed out by driving rain. All stone joints needed to be cleaned out and deep pointed before being repointed using an appropriately designed lime mortar.

The pointing and filleting of ledges should be flush to ensure the shedding of rainwater as efficiently as possible. It was suggested the render to the base be removed to ascertain the condition of the stones beneath, and that if the stone had been clearly dressed and remained in reasonable condition the render should not be reapplied.

The existing slate plaques were fractured but in serviceable condition and could be reset behind replaced stone architraves, which had been removed to facilitate the cement render. The two missing plaques could also be reinstated.

Based on that preliminary inspection, an estimate of £52,400 was given in 2013, excluding VAT, professional fees and new slate plaques.

High-level survey

Having been given the go-ahead to proceed to the next stage, the practice undertook a high-level survey using a cherry picker. This allowed individual decayed stones to be inspected at close quarters and meant that the exact condition of the upper reaches of the needle could be ascertained.

This inspection confirmed the visual assessment, with stone delaminating where weathering of weak beds and washing of clay layers in the stone matrix had allowed water ingress and increased weathering. Iron cramps were corroding to the upper reaches of the needle and this was the cause of the stoop.

The apex stone had entirely failed and allowed rainwater to diffuse into the core of the structure from top to bottom, leaching out the lime matrix and allowing stone to become dislodged. The surface of the stones was etched and pitted due to the extreme weather to which the structure is exposed.

Repair options based on repointing, re-dressing, indenting or renewal were possible on a stone-by-stone basis as a result of this inspection technique. It also allowed the needle to be accurately measured and each stone to be renewed and scheduled. At the same time, a full measured survey of the structure was made, including the moulding details to the lower reaches, which were picked up using plumbs and squares.

Philosophical considerations

After the high-level survey the design work began, and detailed scale drawings, specifications and stone schedules were produced. Part of that process was considering the conservation philosophy to be adopted (see also *Building Conservation Journal* May/June, p.28), and in line with good practice the significance of the structure was determined. The structure has both architectural and historical interest, as demonstrated by its listed status, which describes it as a relatively rare object.

The conservation philosophy was decided with the Follies Trust, and drew on the founding manifesto of the Society for the Protection of Ancient Buildings, the International Council on Monuments and Sites (ICOMOS) Charter (1966), and Australia's ICOMOS Charter (2013), the latter also known as the Burra Charter. The practice's approach was to repair in an effective and honest manner, doing no more than prudence demanded and avoiding tampering with sound fabric.

The work should consolidate the structure without unnecessary restoration or intervention. Where stone sections had deteriorated but and there was enough original fabric to reinstate without conjecture then this was permissible. A combination of traditional and modern conservation techniques would be employed, and the work would seek to eliminate the primary breakdown of the structure. The natural process of general decay would not be arrested.

The tender

The tender package included 1:2 scale drawings of the stone profiles to be renewed, together with detailed drawings of the repairs and rebuilding details. A comprehensive specification linked the drawings, and this was then finished with a stone-by-stone repair schedule that specified the size and bedding of the stone with any repairs required.

The best planned and specified projects will fail if insufficient attention is given to the contractors who are invited to tender. Our built heritage is at risk if contractors with insufficient conservation skills are employed; but perfectly competent local contractors should not be overlooked.

A tender list of contractors was drawn up based on personal observation, matching the size and expertise of the contractors with the size and complexity of the proposed contract. As stone repair was a critical aspect of this project and this trade is usually sublet, the management skills of the main contractor are critical. Likewise, to ensure value for money, the proximity of the contractors to the site is an important element. The number of firms invited to tender should be sufficient to ensure the market is tested, and in this case four contractors were invited to tender.

Traditional repair materials were specified. The original stone was no longer commercially available, so analysis identified a commercially available alternative with a similar chemical make-up, texture and colour to the original. A lime-based mortar was

specified using hydraulic limes NHL 5 and 3.5, depending on the exposure of the stone elements. New stone to the needle was specified as naturally bedded to help reduce weathering at exposed edges.

The practice favours traditional techniques such as hand pointing and dressing of stone. Stone was fixed using methods that had changed little since the obelisk was originally built, although stainless steel was used in lieu of iron to avoid corrosion and expansion.

New stone was specified for the architraves around plaques, based on an accurate profile lifted off an original. A lead damp-proof course was included below the cap stone as a secondary means of throwing rainwater clear of the wall core at its most vulnerable point.

The work begins

A rigorous programme of site inspections, recording and reporting, testing and site meetings ensured the work proceeded in accordance with the Follies Trust's requirements. The structure was inspected again with the main contractor and the stonemasons, and final marking of stone undertaken. This saw some additional renewal of stones that had been partially offset by re-dressing and indenting rather than renewal.

The use of test panels to identify a common understanding of materials and finish was adopted to allow work to proceed smoothly. Traditional stonemasonry techniques were specified with consideration to the application and finish of both masonry and mortars. The selection of an appropriate aggregate was a foremost consideration and drying shrinkage was partially controlled by the use of a well-graded sharp aggregate grit. The lime mortar joints were finished with a churn brush in an attempt to leave an open textured surface, which would increase the area of the face to aid the carbonation reaction.

Although it had been predicted, the extent of washing of the core was only fully revealed when the upper section of the needle was taken down and rebuilt. This occurs on exposed masonry where voids develop in the core of the structure, which allows the rainwater to penetrate deep during driving rain.

Where possible, such voids should be located and grouted to replace the missing matrix. This repair technique can be controversial in building conservation as it cannot be reversed; however, in this case it was considered unavoidable given the extremes to which the structure was exposed year-round on all four elevations.

The apex stone was replaced due to its very poor condition, but has been retained at the base of the structure to allow visitors to see the original mason's mark found on its underside. The two missing slate plaques were remade using fragments of the original to create a template for the lettering style.

As the work came to an end, all interventions were documented, with marked-up drawings, photographs, updated elevations and details providing a permanent record of what was done. The final account figure was on budget.

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Improve your conservation skills

Alan Forster explains how you can broaden your experience in the field

Building surveyors are encouraged to look into training, bursaries and scholarships to reconnect traditional crafts with their professional practice.

For many years, the Society for the Protection of Ancient Buildings (*www.spab.org.uk*) has offered the Lethaby Scholarship – the first programme of its kind, which began in 1930. Building surveyors are encouraged to apply for this annual award, which aims to provide in-depth understanding of traditional construction methods, materials and fabric repair, and engender respect for individuals undertaking such highly skilled work. Understanding these areas along with regular maintenance is vital for good conservation.

Between two and four annual bursaries are available, and building surveyors with RICS-accredited degrees and, ideally, a few years spent in practice are encouraged to apply.

The scholarship, which lasts for nine months, includes intensive practical experience alongside expert craftspeople and leading conservation professionals. Discussions surrounding building conservation philosophy are integral to the scholarship, as this is seen as essential for defensible fabric repair.

The programme allows the scholar to develop their personal interests, with visits to a range of traditional buildings where they will experience such crafts as timber-framing, lime-pointing, masonry and blacksmithery.

Applications must be submitted to *catharine@spab.org.uk* by 1 December 2016. For more information or to download an application form, please visit *http://bit.ly/1ZN2MWp*.

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UPDATE

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Heritage Update is compiled by Henry Russell OBE FRICS, School of Real Estate and Planning, University of Reading and Chair of the Heritage Alliance's Spatial Planning Advocacy Group
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Culture white paper

The Culture White Paper published by the government in March has been welcomed by the sector for prioritising heritage. It makes some important commitments as well, including continued funding for the Heritage Lottery Fund's Skills for the Future programme, which offers a range of work-based training designed to provide the expertise essential to the historic environment.

Historic England is charged with identifying how it can offer more support to local authorities; to work with them on national and local heritage records so that communities and developers have easy access to these; and to work with other heritage organisations to develop the sector's international commercial offer.

The government has also provided £3m for the Architectural Heritage Fund to advise communities on how to make the best use of historic buildings, including through ownership.

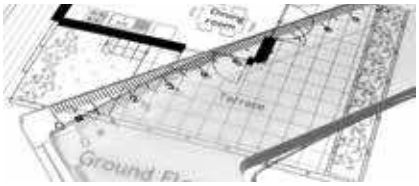
Church quinquennial inspections

The Church of England plans to introduce changes to the quinquennial inspection system in the wake of the Church Buildings Review chaired by the Bishop of Worcester and the faculty simplification programme, which has streamlined application procedures for works. The enabling legislation for the proposed reform will be submitted to the General Synod in July, with the substance and detail set out after this in regulations and statutory guidance following detailed consultation with all dioceses and other interested parties.

Heritage research

The seven UK research councils support academic research through funding and grants, and have published their delivery plans for 2016–20. Heritage falls under the remit of the Arts and Humanities Research Council (AHRC), and is identified as a key strand as it has the potential to: "..secure the UK's place at the cutting edge of this dynamic multidisciplinary field. There is clear potential to connect Heritage with the new Global Challenges Research Fund ... with regard, for example, to the protection of cultural heritage from the consequences of conflict (Palmyra provides a salutary reminder of the potential for new digital technologies to record archaeological treasures), the sustainability of heritage in the face of urbanisation and climate change, or the role of heritage in helping societies confront difficult and divided pasts."

AHRC Delivery Plan 2016/17–2019/20 **(http://bit.ly/1rGOHAK)**



Housing and Planning Bill

While the bill proceeds through Parliament, technical consultation by the Department for Communities and Local Government on how the provisions of the legislation will be implemented closed on 15 April.

The department sought views on a range of provisions in the bill, including the following:

- planning permission in principle
- register of brownfield sites suitable for development
- small sites register
- local plans and neighbourhood planning
- broadening the planning performance regime
- testing competition in the processing of planning applications
- changes to planning application fees.

Implementation of planning changes: technical consultation
http://bit.ly/1QnA1cD

Apply now for certification

The new RICS Historic Building Professional Certification recognises those with experience in managing the performance of built heritage.

Application requires submission of five case studies, detailing issues addressed and outcomes achieved. Assessment is by interview, focusing on conservation philosophy across the individual's discipline.

The next deadline for applications is 29 July 2016.

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