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Briefing

Keep up to date on RICS’ COVID-19 response

During the COVID-19 outbreak, RICS is closely monitoring developments and following official advice to ensure we continue to support the profession. We encourage all members and member firms to visit and bookmark rics.org/coronavirus, which RICS is updating regularly. The page includes:

- resources for candidates and professionals, with online CPD free until July
- guidance on key concerns and risks, including dispute resolution, inspections, personal indemnity insurance, planning, support for SMEs, valuations and more
- news and insight
- responses to frequently asked questions.

Any queries or concerns not dealt with on the site should be directed to covid19@rics.org

Follow RICS on social media

RICS is regularly updating its social media channels on its response to COVID-19. We encourage you to follow RICS on your preferred social media channel.

- Facebook: @ricssurveyors
- LinkedIn: RICS
- Twitter: @RICSnews, plus various profiles specific to regions.

COVID-19 related content

Because of long lead times, anything we publish about the virus or its implications in the journal will likely be out of date before it reaches you. If there’s any content you would like to see that relates to the impact the virus is having on our professions please let us know, as we may be able to publish more reactive pieces on the RICS website.

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Navigating uncharted territory

With the COVID-19 pandemic, we find ourselves in uncharted territory, and many of us have faced significant disruption to our work and home life. Discussions with members, old colleagues and friends over the past few months have exposed a range of difficulties – but also highlighted how innovation and adaptable approaches to work have been used successfully to overcome some of these hurdles.

RICS will continue to update members with COVID-19 advice through the dedicated webpage (see story on the left). Please do keep an eye on this, as the situation is fluid and our advice will be updated appropriately.

Finally, following a successful beta phase, our digital insight community has now arrived with fortunate timing. This forward-thinking initiative allows both surveyors and the wider built environment sector to share their insight and engage with RICS directly in a two-way flow, and it’s great to see technology being used for effective communication with members across the globe.

We have set up a community for building surveying, building control and conservation topics on this platform, which will provide interesting and important updates relevant to our profession. I encourage you to use this while we face these challenges together, to share your observations, problems and successes so we may all learn from them. To join the community, please email digicommunities@rics.org

I wish you all a safe transition to more stable times, and if you would like to contact me personally please do so.

Craig Ross is associate director, built environment at RICS
cross@rics.org

Take care of your well-being

RICS is committed to supporting the mental health of its members and APC candidates at this unsettling time. The independent charity for RICS professionals, LionHeart, continues to offer support, including free and confidential advice, financial support, professional counselling and legal advice.
lionheart.org.uk

Guidance offered for SMEs

RICS recognises that this may be a particularly difficult time for small businesses. We have therefore dedicated a page on the website to providing guidance and support for owners of such businesses and those working for them.

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RICS.org/supportforsmes

Events

All events are subject to change during the COVID-19 pandemic. You are advised to check the RICS website regularly for updates.
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For the last three years of my built environment career I have been involved with digital transformation in one form or another, and I have seen first-hand what works, and more to the point, what doesn’t. As an industry, we are poor at sharing our successes, let alone where we have failed, so I want to share some of my experiences in the hope that it improves your chance of succeeding in whatever transformation project you undertake.

1. **Don’t underestimate the power of leadership.** I have seen good, bad and a lack of leadership when it comes to transformation. In my experience there are three mistakes that leaders generally make when they are managing a transformation project. They either don’t understand their teams and their abilities, they concentrate too heavily on processes and pre-conceived philosophies, or they invest too much in new systems without focusing on the impact on organisational culture and their people. My biggest point about leadership, however, is around the experiences of decision-makers. A lot of the time, those in positions of authority aren’t as digitally literate as you may hope. Therefore, having empathy is key when explaining to leaders how their business needs to change. How would it feel to be told you need to embrace a technology that you don’t fully understand?

2. **For successful technology transformation, don’t focus on technology.** I know this sounds odd but it’s a mistake made time and time again; organisations fall into the trap of buying a product without truly understanding why they need it and how it will be used. Organisations generally know what they want the technology to do, however, so they start with this and buy a product based on its purported functionality, not how easily it can be used by those expected to work with it or, more importantly, if it will improve how employees deliver projects and do their jobs. This again comes down to empathy. How will decisions made during the transformation project affect those you are asking to change?

3. **Put employee engagement first.** At my previous company I helped run a transformation project where staff were asked to consider what innovation meant to them in a simple, approachable way. We asked them what they are proud of and what they would like to do, which then enabled us to gain a baseline of where the business stood in terms of innovation and technology, while also engaging employees with the work we were doing. Simple, yet effective. In the past I’ve seen, and been involved with, transformation projects that don’t have this approach and instead look mainly at the bottom line. Ultimately, projects that don’t adequately engage with staff and instead are obsessed by return on investment may succeed for a short period but fail to stick and truly transform the organisation.

4. **You must change perceptions if we are truly going to transform.** If you are trying to do something new then you are going to bring something alien to the organisation, which will make everyday procedure difficult or even uncomfortable for a while. This needs to be tackled head on and the way you do that is by playing on the fact that things are developing by bringing a new way of leading to the project.

   Try and bring a brand identity to what you’re doing, ideally something that is a little contrasting to the organisation. Communicate differently and communicate a lot; report your wins, losses, progress and what you do on a daily basis. More than anything, have fun with it.

   We take ourselves too seriously in the built environment and bringing some fun to the transformation project will go a long way to making the changes stick.

Rob Toon is founder at This is Change  hello@thisischange.co.uk

**Related competencies include:** Business planning, Leadership

**Further information:** thisischange.co.uk
Growth risk

As the market for cannabis continues to grow, illegal production facilities with their modified electrics and intense lighting pose a serious fire hazard

Paul Redington

In the UK, statistics from the Home Office show that more than a third of a million cannabis plants were seized in 2018. The West Midlands alone saw 67,776 plants confiscated, an increase of almost 40 per cent on the year before. That same year the Metropolitan Police revealed that one cannabis farm was found every couple of days in London.

While 2019 figures are awaited, the UK emergency services have been attending cannabis-related fires since at least the 1970s. But as cultivation increases, so does the number of fires related to illegal factories or farms.

Figures released by London Fire Brigade show there were 12 cannabis factory fires in the capital in the first four months of 2019 alone — approaching the total for the whole of 2018. Many of these fires are in residential premises, posing a serious threat to those living nearby, but fires in cannabis factories in commercial premises are also becoming more prevalent. What’s behind these increases?

First, the demand for cannabis itself appears to be increasing. With a greater focus on medicinal use, some well-known high-street retailers are selling legal products based on cannabis oil — in fact, the UK is the world’s largest producer and exporter of legally cultivated cannabis. With demand on the rise, and coming from a wider customer base than before, a ready market has also been created for illicit production and distribution.

Second, this market means large-scale illegal cannabis production is big business for those involved. There is good evidence that many factories are part of established criminal networks, with many thousands of people involved in the supply chain of this lucrative trade.

Third, much more information about cultivation is now available, and the equipment to start even a small factory is quite easily obtained via the internet. This means that some may begin growing the drug in a back bedroom purely for personal use, for example, and not necessarily to sell on.

What’s clear is that the production of cannabis in the UK is on the rise, and in turn, we can probably expect related insurance claims to continue heading in the same direction. Although insurers do not collect specific statistics on fire claims related to cannabis production, there is good evidence that they are currently seeing more losses relating to these factories — and that those claims are becoming larger.

The picture, above and below, shows the aftermath of a large warehouse blaze in Tottenham in May 2019, believed to have started in one unit that was being used to produce the drug.

The fire burnt for more than 24 hours and took 100 firefighters to extinguish. Zurich insures one of the neighbouring units, with the resultant claim by the innocent customer costing more than £1m. The image gives a graphic picture of the destruction these fires can cause.
And it’s not just fire that’s an issue with cannabis factories: damage related to leaks from irrigation systems is also prevalent, as are problems resulting from condensation in the building fabric caused by the humid environment that a factory may create. Holes are sometimes cut in ceilings to provide ventilation or to enable access for wiring, which in itself is often substandard.

Where a fire does occur, it is often due to the temporary lighting and heating equipment that has been rigged up in the premises. High-powered industrial lamps are often used, and they produce significant heat – with all the associated risks. High-powered industrial lamps are often used, and they produce significant heat – with all the associated risks. In turn, any electrically-powered ventilation system that may be required creates additional hazard if not installed properly. Finally, all this set-up requires considerable energy and, in turn, cabling. Most of this is poorly installed, and subject to potential short circuits and resistive heating faults that can easily cause wiring or any combustible materials around it to ignite.

Insurers such as Zurich continue to work with property-owning customers and their advisers to guide them on steps that can be taken to protect premises, and reduce the chances of them being a victim of an unscrupulous occupier. Reputable property owners can easily fall victim to a tenant or subtenant who decides to set up a cannabis factory, meaning it is crucial that landlords have a robust vetting system. Tell-tale signs may be tenants who seek to pay rent in large sums of cash or are unable to supply proper references. Failing to conduct proper checks on prospective tenants can even mean a property owner is in breach of an insurance policy condition.

Vacant premises are also an issue. In some cases they have been broken into and used as cannabis farms without the knowledge of the owner. Once established, the farms themselves are then left largely unattended, meaning any fire that may develop is not dealt with until it takes hold. Fires are often only spotted by neighbours or passers-by, increasing the level of damage to the premises itself and the threat to adjacent buildings.

It is therefore vital that empty premises are properly secured and visited regularly, with careful internal inspections where possible, as external inspection alone may give no indication as to what is going on inside. Neighbours may see very little coming or going either, so factories can remain undetected for months – if not for a longer period.

The risks associated with illicit cannabis farms are clear, with fire being the most obvious hazard. It is a problem that shows no signs of abating. Those who own and manage property need to take appropriate steps to avoid becoming a victim of something that is a growing issue for both them and their insurers.

Gary Strong, RICS global building standards director, comments: ‘Cannabis farms and damage from fires and illegal occupiers are issues RICS professionals need to be very alert about, and regular inspections of vacant property are essential. If adjacent property is also observed to be suspected of being used for a factory, this should be reported to the police.’

Paul Redington is a regional property major loss manager at Zurich Insurance paul.redington@uk.zurich.com

Related competencies include:
Fire safety
Highly culpable

There will be harsh legal ramifications if you neglect fire safety measures, with one case providing a salutary reminder of developers’ responsibilities

Trevor Rushton

The Grenfell Tower fire symbolises the woeful safety practices prevalent throughout the construction industry before June 2017. One would like to think that we are now all alert to the risks, and that sloppy development and construction practices would no longer be tolerated.

However, hindsight brings perfect vision; and although many would appreciate the appalling consequences of a single avoidable fatality, let alone 72, it is worth reflecting on the fact that simply permitting the risk of injury can also have very serious repercussions. Make no mistake, if you are guilty of placing the lives of others at risk, you can expect to be treated harshly — you can suddenly find yourself in the criminal justice system with the attendant costs, stress and reputational damage that ensue.

Take for example the 2016 student development at Trinity Halls on Woodhouse Street in Leeds, which comprised 94 bedrooms built over four floors in a gated community. The building was due to open on 19 September that year but was still incomplete, meaning students had to be placed into temporary accommodation. It is not difficult to imagine the pressures that this situation would have put on all those involved.

However, four days later, 27 students were moved to the new site. Residents found that they were entering a building site, with works in progress on the upper floors. On dropping his daughter off, the father of one student was so concerned by what he saw that he would not let her stay there. He contacted the Yorkshire Fire and Rescue Service, who served a prohibition notice and required all occupants to move out. Chris Kemp from the fire service said the conditions on site ‘were such that some of our senior officers have not seen such blatant disregard for the law and the safety of residents in 28 years’.

Legal action ensued, and the litany of defects heard by the court included:
- a locked staircase to one of the two main fire escapes
- no fire escape signage
- self-closing devices missing from doors
- the upper floors of the building still being under construction, with exposed timber
- parts of the staircase covered in bubble wrap, and floors separated only by plywood
- the fire alarms not connected properly, only being operable manually
- the alarms ringing with only limited noise, making it likely they would not have been heard in the event of fire
- flammable material being stored in rooms on the ground floor
- the boiler room lacking appropriate fire protection.

The court also heard that some residents would have been 35m from the nearest fire escape — almost double the recommended 18m distance.

According to Judge Robin Mairs, the conditions at the building had the ‘potential for catastrophe’. He added that all the companies had ‘high culpability’ and that ‘the risks were so obvious that a member of the public spotted them — so they should have been obvious to the companies involved’.

Developer Trinity Developments Ltd and property manager Niche Homes Limited both pleaded guilty to four charges:
- failing to make a suitable and sufficient fire risk assessment
- failing to take precautions to make sure the premises were safe from risk of fire
- failing to provide an appropriate fire detection and alarm system
- failing to provide an adequate number of fire escape routes and exits.

Trinity was fined £160,000 and Niche Homes £60,000. The design and build contractor, APP Construction, pleaded guilty to a charge of failing to provide an adequate number of fire escape routes and exits and was fined £450,000. The amounts would undoubtedly have been higher had the defendants not pleaded guilty, but they nonetheless illustrate the likely order of costs that will be imposed on those who ignore fire safety.

Gary Strong, RICS global building standards director, comments: ‘RICS reminds firms and members to pay particular attention to sites under construction, and to agree the fire safety strategy at an early stage with fire and rescue services if such a building will be partially occupied.’

Trevor Rushton is a technical director at Watts

trevor.rushton@watts.co.uk

Related competencies include: Fire safety
Check your electrics

Private landlords in England should be ready ahead of the planned introduction of new electrical safety standards

Gary Parker

The Electrical Safety Standards in the Private Rented Sector (England) Regulations 2020 is due to come into force on 1 June. This legislation will make electrical installation condition reports (EICRs) mandatory for all private rented dwellings in England from 1 July for new tenancies, and from 1 April 2021 for existing tenancies. At the time of writing this is still draft legislation and could change. However, private landlords should make themselves aware of the draft to ensure they comply with the final requirements (bit.ly/ESS-PRS-regs).

In brief, all dwellings will require a suitable and satisfactory EICR at intervals of no more than five years. An EICR is a risk assessment of an installation. Where non-compliant items are found, this results in an unsatisfactory report. If the report shows no non-compliances, then the report is satisfactory. The landlord must provide copies of the report to any tenant, though a new one will not be required for a change of tenant providing the existing report is still in date and satisfactory. The landlord must retain copies of the report to provide to the next contractor undertaking an EICR and, if requested, supply copies to the local housing authority within seven days. The legislation requires a qualified person to carry out the reports and defines them as someone ‘competent to undertake the inspection and testing required and any further investigative or remedial work in accordance with the electrical safety standards’. Landlords should ensure that any contractor they use to undertake the EICR is suitably skilled and knowledgeable in that area or work, with a list of suitable contractors available at eca.co.uk. Failure to comply will be costly. The local authority can impose fines of up to £30,000 on a landlord in breach of the legislation. It also has the power, once a remedial notice has been served and the tenant has consented, to enter the premises, undertake the work related to the remedial notice and recover the costs from the landlord.

Buildings will be assessed against BS 7671: 2018 Requirements for Electrical Installations. IET Wiring Regulations. This does not mean all properties will immediately require rewiring to fulfil the requirements of the modern standard completely; just that the building has no electrical safety issues that are dangerous or potentially dangerous, or that require further investigation without delay. Any items found that are dangerous, potentially so, or in need of investigation will result in an unsatisfactory report, and will require rectifying within 28 days.

Landlords should check whether their electrical installation is in good order by ensuring they have a suitable contractor undertake an EICR. Not all electrical contractors can do such work, so it is always worth asking whether a potential contractor is skilled and experienced in this field. The landlord should also protect themselves against rogue contractors who claim they can undertake an EICR in an unfeasibly short time.

It is difficult to estimate the time a reasonable report would take to compile, as this depends on the number of circuits, access and space and how many people are on site. However, anyone offering to undertake an EICR in a property with ten circuits in less than an hour for a nominal fee should certainly raise suspicions.

Gary Strong, RICS global building standards director, comments: ‘RICS will update members if the draft legislation changes from that at the time of writing.’

Gary Parker is technical manager at Electrical Contractors’ Association technical@eca.co.uk

Related competencies include:
Health and safety,
Legal/regulatory compliance

The local authority can impose fines of up to £30,000 on a landlord in breach of the legislation.
Cutting carbon

A whole life carbon assessment is the most comprehensive way to gauge and ultimately reduce a building’s carbon footprint – and RICS’ Whole life carbon assessment for the built environment professional statement is the requisite guidance.

Simon Sturgis

The reduction of carbon emissions in the UK has become increasingly important since the government’s net-zero 2050 target was announced. The built environment is responsible for almost 40 per cent of the UK’s carbon emissions and is therefore one of the key sectors required to reduce emissions.

A whole life carbon (WLC) assessment — an assessment of the sum total of all building-related emissions over a building’s entire life — is the most comprehensive approach to achieving these reductions. WLC includes operational carbon emissions from day-to-day energy use and embodied carbon emissions, including material sourcing, fabrication of components, transport, construction, maintenance, repair and replacement, demolition, dismantling and disposal. The objective of a WLC assessment is to ensure the minimum overall lifetime carbon emissions and the maximum lifetime resource efficiency.

The structure of a WLC assessment is defined by British Standard BS EN 15978:2011. The standard breaks down the life cycle of a building into life cycle modules, but it is not sufficiently precise or informative about how a WLC assessment should be undertaken. In 2015, a group that I led — and included representatives from RICS — received funding from Innovate UK to provide a detailed methodology for a WLC assessment. As a result, RICS published the Whole life carbon assessment for the built environment professional statement in 2017 and it became mandatory and regulated by RICS in May 2018.

The professional statement gives guidance on a range of issues involved in a WLC assessment including spatial boundaries, units of measurement and carbon sequestration. It also explains how to assess each of the following life cycle modules:

- A1–A3: Product stage
- A4 and A5: Construction process stage: transport to site and construction installation process
- B1: Use
- B2: Maintenance
- B3 and B4: Repair and replacement
- B5: Refurbishment
- B6: Operational energy use
- B7: Operational water use

The alignment of carbon and financial cost is not surprising as their reductions both rely on the efficient use of resources.

- C1: Deconstruction and demolition process
- C2: Transport
- C3: Waste processing for reuse, recovery or recycling
- C4: Disposal
- D: Benefits and loads beyond the system boundary.

For an assessment at the RIBA Plan of Work stages two or three, actual materials and systems will not be known with any precision, and therefore the professional statement offers default figures to be replaced by project related figures as the project progresses.

A life cycle assessment (LCA) — a future projection of the carbon cost of anticipated day-to-day energy use, maintenance cycles, repair and replacement cycles and final demolition — is inherent in a WLC assessment and is usually presented as a graph showing annual carbon emissions over 60 years. The objective is to understand, at the design stages, the overall future carbon emissions performance of a building over its entire life, and therefore what can be done to decrease emissions. In addition to the mapping of anticipated future carbon emissions, it is possible to add a cashflow to the LCA to give a building owner a combined construction and ‘In-use’ cost, that is, a total cost of ownership.

The alignment of carbon cost and financial cost is not surprising as their reductions both rely on an efficient use of resources. Typically, for the ‘Upfront’ carbon costs — those embodied emissions up to practical completion covered in modules A1–A5 — the better carbon options also have lower costs.
My company, Targeting Zero, reviewed tender returns from an embodied carbon perspective for a global technology company’s new headquarters and found that the lowest carbon and lowest financial cost aligned in every case. Several major London-based developers now see ‘Upfront’ embodied carbon assessments as part of value engineering and, therefore, contributing to reduced construction costs.

By also considering ‘In-use’ carbon costs — modules B1–B7 — it is possible to examine the carbon cost of fabric improvements against the carbon benefits of improved energy performance. This is important as it shows that operational energy use should not be viewed independently from embodied emissions: to optimise overall emissions, both operational and embodied emissions need to be considered together.

For example, when selecting insulation, the decision should be based on both the U-value, or thermal transmittance, and the carbon dioxide equivalent emitted per square metre — KgCO₂e/m² — to make the material. This material and product-related carbon footprint information can be obtained from Environmental Product Declarations (EPDs) — there are now over 7,000 EPDs available for individual products.

A further benefit of understanding ‘In-use’ emissions is that future performance can be determined in relation to different factors, such as lease cycles or climate change. The more durable and resilient the design, the lower the post-completion carbon impact will be.

**Actions to take**

Following an initial WLC assessment, there are several actions that can be taken to help reduce the WLC footprint of a building.

- **Retrofit.** The retrofit or reuse of an existing building — as a whole or in part — is preferable to a new building as it is typically the lowest carbon option. A retrofit has a significant embodied carbon benefit due to the existing structure and materials already on site.

- **Using recycled materials and content.** Using recycled materials as opposed to newly-sourced raw materials typically reduces the carbon emissions from constructing a new building. Many currently available standard products already include a degree of recycled content, and therefore the supply chain should be encouraged to provide the project team with this carbon footprint information.

- **Material selection.** The sourcing of materials and the fabrication of products is the single largest contributor to embodied carbon emissions over the life of a building. It is important to note that the overall lifetime carbon footprint of a product can be as much down to its durability as to what it is made of. For example, bricks may have a high carbon cost to make but they have an exceptionally long and durable life expectancy.

- **Operational emissions from day-to-day energy use.** A fabric-first approach where the building’s envelope is designed to minimise heating and cooling requirements can have long-term carbon emissions benefits. A naturally ventilated scheme avoids the initial carbon costs of new plant and distribution, as well as the repeat carbon costs of equipment replacement.

- **Reuse of a building’s components at end of life.** Designing for future ease of dismantling, rather than normal demolition, means that materials and products can be reused for the same purpose as originally intended. A simple example is to use lime mortar with brickwork rather that cement. The former can be cleaned off allowing the brick to be used as a brick, whereas the use of cement mortar means the bricks end up as landfill. The choice of recycled materials in combination with designing for future reuse contributes to the circular economy.

- **Wall to floor ratio.** Also known as the heat loss form factor, wall to floor ratio has embodied as well as operational consequences; compact and efficient buildings perform better for these reasons.

- **Durability and future flexibility.** Considering these at the outset of design reduces maintenance and other life cycle costs and facilitates future retrofit, therefore reducing the likelihood of future obsolescence. Every project brief should have a building design life specified, with a requirement for method statements for future repair and replacement as part of the procurement documentation.

- **Embodied and operational emissions.** Optimising the relationship between the two types of emissions is important to ensuring whole life carbon reduction efficiency. The objective is to understand, over a building’s life, the carbon cost as well as the carbon benefit of any action to improve its performance. For example, the use of insulation has a clear carbon benefit, whereas its fabrication has a carbon cost. This means that it is important to look not only at the U-value of insulation, but also the carbon cost of the manufacture and installation of different product options.

- **Local sourcing.** This reduces transport distances and therefore supply chain lengths. It also has associated social benefits including, for example, local employment.

- **Waste minimisation.** This is a key feature of low carbon design and procurement through all life cycle stages and means understanding how materials and systems are sourced and fabricated. Building designers must understand how products are assembled on site to ensure minimum waste.
• Efficient fabrication. Construction techniques such as using modular systems, precision manufacturing and modern methods of construction can contribute to a reduced construction carbon footprint due to more efficient fabrication, and reduced snagging and early replacement.

Many of the above principles require actions — by developers and project teams — that may be seen as of limited benefit to the developer in the immediate future. There are three key arguments that can be used to convince developers of the benefits of investing in a low carbon approach.

First, most of the principles listed above don’t necessarily add to construction costs — and many will actually reduce the total cost of ownership. Second, it is very possible that if the valuation of buildings starts to include climatic resilience and performance and an LCA as part of due diligence carried out then these actions will become essential. Finally, being ahead of future regulation change will reduce building obsolescence and therefore benefit developers in the long term.

Impact of the professional statement
Since the publication of the professional statement in 2017 numerous organisations — including British Land, Landsec, Derwent, Grosvenor, the Portman Estate, Warwick University and Quintain — have embedded its guidance in their practices. It is also being used on HS2 and the latest Heathrow expansion to mitigate carbon impacts.

Other documents such as RIBA’s Embodied and whole life carbon for architects, the UKGBC’s Net zero carbon buildings: a framework definition and London Energy Transformation Initiative’s Climate emergency design guide all make direct reference to the professional statement. The Mayor of London also explicitly referenced the professional statement in the London Environment Strategy, released in May 2018.

At the time of writing, the Greater London Authority’s London Plan is being updated and will require all referable schemes — including developments of 150 or more residential units, developments of more than 30 metres high outside the City of London and developments on green belts or metropolitan open land — to carry out a detailed WLC assessment in accordance with the RICS professional statement and BS EN 15978:2011. These will be required both on submission of the scheme and post-completion. The detailed guidance in the London Plan also suggests that WLC assessments will soon be a requirement on all submissions in the near future. Other UK local authorities are likely to follow the example of the London Plan and tighten up all existing building and planning regulations.

For those buildings currently on the drawing board, sticking to the current regulations may be a bigger risk than future proofing the asset value of your building with a WLC assessment and resulting actions to reduce its whole life carbon footprint.

The fact that the London Plan guidance is about assessing the entire life cycle of a building will help clients better understand overall lifetime performance in both carbon terms and cost terms. This will affect how buildings are valued, with a WLC assessment becoming a fundamental part of due diligence in assessing future asset performance and value.

Further, climate change is increasingly becoming a consideration from the perspective of investment and insurance risks, and the likely impact it may have on occupier sentiment. Buildings that are not climate friendly, or low carbon, are likely to be at a disadvantage in the future. There are several international organisations, such as the World Business Council for Sustainable Development (WBCSD) and the Principles for Responsible Investment (PRI), that are advising both investors and insurers on the implications of climate change.

The PRI states: ‘As part of wider efforts to implement the Paris Agreement, every real estate asset owner, investor and stakeholder must now recognise they have a clear fiduciary duty to understand and actively manage ESG [environmental, social and governance] and climate-related risks as a routine component of their business thinking, practices and management processes.’

The next steps for WLC assessment and reporting will be to gather more building-related data — the London Plan requirements will greatly assist in this. Further measures are required to ensure consistency of reporting, and these need to feed into the available assessment software that currently produces different answers from different types of inputs.

It’s important to remember that the environmental landscape when the Whole life carbon assessment for the built environment professional statement was launched was very different to how it is today. However, it is encouraging that, although further work needs to be done, the importance and necessity of WLC assessments has become far more widely understood over these past three years.

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Related competencies include: Construction technology and environmental services, Sustainability

Further information: The RICS Building Carbon Database can help users identify where carbon emission reductions can be made throughout a building’s life cycle. You can submit your data at rics.org/carbondatabase.
What risks does a surveyor face when they take advice from a third party, and bases their survey or valuation on that advice? The point has become particularly topical in recent months, with a new arrangement for the valuation of high-rise buildings agreed jointly by RICS, the Building Societies Association and UK Finance, and the publication of the EWS1 form, due to be covered in detail in a later article (rics.org/highrisevaluation).

In the meantime, this article will provide guidance as to when a surveyor may face a claim where they have relied on the advice of a third party, and what they can do to reduce or eliminate that risk. The default position for any professional is that, in performing the service they have agreed to provide to the client, they will be liable not only for their own negligence but also for that of anyone to whom they delegate the provision of those services. If a client believes that there has been an error in the survey, or that the property has been overvalued, the starting point will always be to pursue a claim against the surveyor.

However, in circumstances where independent third parties are instructed to undertake specialist tasks on behalf of the professional providing the services — for example, where the surveyor conducting a survey seeks specialist advice from a structural engineer or an asbestos consultant — then if the task to be delegated is outside the professional’s normal area of expertise they can argue that they should not have any liability to the client in the event that the advice provided by the specialist is wrong.


The Co-op argued that the engineer could not discharge its duty of care by relying on that specialist advice, which it said constituted a delegation of duty. The judge disagreed, and found that John Allen Associates was able to discharge its duty by relying on the specialist because it had acted reasonably in doing so.

Professionals seeking advice from independent specialists when preparing a survey or valuation should be mindful that they themselves may have to answer claims when that advice is wrong.

Alexandra Anderson
In light of this finding, a surveyor can discharge their duty by relying on a specialist professional, so long as they have acted reasonably in accepting and adopting that advice in preparing the survey or valuation. A surveyor who seeks assistance from a structural engineer will be able to defend a claim for losses caused in the event that the engineer’s advice is wrong so long as the surveyor acted reasonably in accepting, and basing any conclusions or recommendations set out in the survey on, the engineer’s advice.

The question that then arises is what ‘acting reasonably’ means. In Co-operative Group, the court set out four factors to be weighed in the balance when considering whether it is reasonable for a professional person (for our purposes, a surveyor) to rely on the advice of the third party expert.

- **Is assistance taken from an appropriate third-party expert?** Has the surveyor considered the qualifications or expertise needed to advise on the specific point, to ensure that the third party from whom they are seeking the advice is competent to give it? This would not require the surveyor to do a significant amount of due diligence on the expert, but they would be expected to check that the expert had the appropriate qualification to advise on the relevant point.

- **Is there any information that should lead the surveyor to warn about the reliability of the expert’s advice?** Again, this would not require the surveyor to second-guess the advice received from the expert, but they would have to sense-check the report and consider, for example, whether it is based on all the relevant information and a proper inspection of the property.

- **Does the client have a remedy for any losses caused if the expert advice turns out to be wrong? If so, to what extent?** A court will always want to protect an innocent client who has agreed to purchase a property, or has made a loan secured against a property, relying on incorrect advice. Much will turn on whether the client has a direct route of redress against the expert; or for breach of duty of care in tort, to avoid the court finding that the only means of redress is through the surveyor.

- **Should the surveyor advise the client to seek advice elsewhere? Or should they themselves take professional advice under a separate retainer?** Applying these criteria to the situation where, for example, a surveyor instructs a structural engineer to advise on the likely cause of, and appropriate remediation for, a crack in the wall of a property, then any claim from the client concerning any errors in the survey or valuation that can be demonstrated to arise from errors in the expert’s advice should fail, so long as the surveyor can show that:
  - it was necessary to take advice from the engineer
  - the advice received appeared to be reliable
  - the client has the option to bring a claim against the engineer
  - it was reasonable to instruct the expert, rather than leaving it for the client to do so.

In order to reduce the risk of a client attempting to bring such a claim against a surveyor in this situation, the following steps are recommended.

First, surveyors should seek to include a disclaimer formally stating that they are relying on the advice of the third party, and to disclaim liability for any losses arising from the information contained in that advice. Before providing the survey or valuation, the surveyor should agree with the client that, if the surveyor seeks specialist advice on a particular point and then relies on that advice when preparing the survey or valuation, no claim shall be made against them if the advice from the expert turns out to be wrong and that error then causes the client a loss.

Second, the surveyor should always include a copy of the expert’s advice with the survey or valuation, so it is clear on what basis the relevant sections of the report are prepared.

Third, it would always be preferable for the surveyor to ensure that the client appoints the expert direct, or that the expert provides some form of warranty to the client, so that, in the event it turns out that the advice provided by the expert is wrong, the client can take action against them directly without having to involve the surveyor. Even if that isn’t possible, the surveyor should ensure that the expert knows who the client is and why their advice is sought, so that, even if the client cannot bring a claim for breach of contract, they can provide the necessary evidence for a claim in tort, to avoid the court finding that the only means of redress is through the surveyor.

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Related competencies include: Client care, Legal/regulatory compliance
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Legal

‘It is important not to be seen as fence-sitting in cases where the client wants and needs some clear advice’

Jeffrey Tribich
Hollis

In construction legal cases over the years, I have reviewed documents put forward by parties in support of their representations. A common feature I have seen is informally scribbled annotations that, clearly, the writers did not envisage would be disclosed in future legal proceedings: some of these comments contradicted the claims and undermined the very cases that the litigants were trying to prove.

With fewer paper documents and increased digital working, this sort of error may not be so frequent now. However there are still situations — although not always in an identical context — where you should think carefully about whether and how to comment on documents.

A case in point is where you as a surveyor have been asked to comment on or approve documents. The implications of approving documents may not be fully understood, especially by less-experienced professionals. As a general rule you should avoid such approvals, as these may make you liable where liability would otherwise remain solely with the authors of the documents. Furthermore, documents produced by others may simply not cover aspects of work with which you are contracted to deal. In such cases you would need to restrict comments to matters that affect or impinge on your input and areas of work.

There is also the question of whether you have the competence to comment on the particular subject matter. The default position should be to avoid commenting or approving unless there is a clear reason to do so. At the same time, it is important not to be seen as fence-sitting in cases where the client wants and needs some clear advice: not commenting could, first, be seen as unhelpful and, second, be in breach of a contractual obligation to use reasonable skill and care if there is something that warrants comment. There will be circumstances in which you need to highlight matters that require review or development whether or not you are instructed specifically and explicitly to do so, as this is in the client’s interest.

It is important to keep the following points in mind:
• If your instructions require you to comment on or approve documents then do so, using reasonable skill and care, but only when it is within your capability. If necessary, consult with colleagues and try to reach a collective view.
• Do not be casual with wording: do not ‘approve’ a document unless a client’s instructions require you specifically to approve them.
• When you comment on a document, keep the comment as brief and to the point as possible, and try to avoid giving specific instructions on what to change. Limit comments to, for example, pointing out where the document falls short of complying with guidance, legislation or a contract.
• Once the document has been reviewed, developed further and reissued to you, you should comment again as necessary. Revised documents may not take account of some of your initial comments and you should not be shy about repeating them. When you have no further comments — and this may involve a number of iterations — you can explicitly state that you have ‘No further comment’.
• A good general approach is to provide advice where you can and not to hide behind professional indemnity insurance restrictions if at all possible, but at the same time not to ignore such restrictions. Ensure that you bring a positive attitude to your instructions, and think carefully about wording and express meanings accurately — these are good general principles in any professional dealings.

Of course, this is general guidance in relation to all professional services, and any particular approach or response will need to be service-specific. To conclude, be clear about what you are doing and why, and keep in mind at all times the possibility that you could be called on to justify your comments in a court of law.

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Related competencies include: Client care, Inspection
Further information: Thanks are due to Alex Brown, partner at Hollis, for contributions and comment for this article.
This year’s model

It is time to put people and sustainable design higher up the commercial agenda when it comes to building performance

Austen Bates

The efficient, effective and sustainable operation and maintenance of building engineering systems ranks among the biggest costs in real-estate management. Getting these right is critical to improving building performance, reducing costs, and providing a safe and comfortable environment for building occupants.

But the development of the occupier market – with social, technological and economic shifts – demands a reappraisal of what performance means. There is an increasing expectation that modern buildings, whether new-build or existing, should maximise long-term social value and customer experience while minimising environmental impact. This is a challenge for investors, owners, occupiers and the communities around them.

Consultancy services for operational buildings historically focus on technical advice about the performance of building materials and services. This advice was previously limited to building managers, but those who are involved in the acquisition, management, occupation and disposal of assets need to also consider performance in the terms of their markets, encompassing occupant well-being, sustainability and user experience. The market is driving this, and the advice and discipline of specialists needs to evolve accordingly.

Whatever their specialism, surveyors understand the complexity of buildings and the array of technological, environmental and social systems that interact with them across their life cycles. But a new model of building performance must more explicitly consider user experience and workplace well-being alongside established sustainability metrics and technical due diligence (TDD). The result should be that buildings become more people-focused, predictable and effective in operation, making them fit for the future.

Much has been written about the behaviour of building users and what it means to design places for people. We also know more than ever about the urgency of addressing climate change, and the role of buildings in mitigating and preparing for its impact. So a better approach to appraising buildings would need to consider a broader set of outcomes than technical outputs alone, to make these into fundamental performance indicators.

Building design and performance is historically rated by outputs more than outcomes with success judged by, for instance, the right energy performance
certification or BREEAM rating. Judging outcomes, by contrast, means asking whether a building will be more resilient to future climate change impacts, whether an office will help improve local air quality or create more local job opportunities, or whether occupants will be happier at leisure in one location and more productive at work in another. These may not be quantified by a straightforward certification, but they do have a direct impact on the future success of a building.

Such questions inform a growing proportion of TFT’s work with investors and developers, because of a commercial agenda linked to market expectations. But a skills gap across real-estate management could prevent it answering those questions. Consultants, engineers, surveyors and other professions understand the building fabric and systems, as well as the physical infrastructure it contains. But they may lack the soft skills needed to engage with the people using the building, who rely on and interact with the physical structure to make the whole building system work as it should. Demand is there but the skill set needs to change.

Holistic performance
Part of our response should be to formalise these expectations by augmenting a traditional model of building performance with new components. An holistic view of building performance, for example, puts people-centred and sustainable design higher up the commercial agenda. It will also provide engineers with a better basis for shaping different commercial outcomes for owners and investors across the life cycle of a building.

Surveyors and engineers are well aware of the need for TDD as part of the acquisition, occupation and disposal of commercial property. The process provides a means of informing transactional decisions and safeguarding investments by focusing on the building structure, fabric and services. From a building services perspective, this will often include a mechanical and electrical engineer assessing the mechanical, electrical and vertical transportation installations and providing a professional opinion. These surveys are a fundamental piece of the building puzzle, but can no longer be separated from the following:

- **Environmental sustainability**: the aim should be to ensure that buildings consume less in the way of non-renewable resources during operation, and not simply be deemed to do so by compliance or design alone, as is typical in building certification today.
- **Workplace and well-being**: the occupier market, and therefore the real-estate sector, is increasingly aware of the relationship between buildings designed for well-being and the enhanced performance of the people and organisations who use them. In addition, an increase in policy that promotes well-being, the adoption of relevant certification by some owners, and ongoing marketing trends will move the issue from growing trend to fundamental building criterion.
- **User experience**: this and the level of service in a building are critical to support its function as well. Sectors are blurring, and many kinds of business occupier are being influenced by business areas such as hospitality, which lives or dies according to the level of experience it provides. This approach appears intuitive but is newly important in a commercial climate of short leases and fierce competition based on experience offering. Elevating customer experience to become part of a building’s wider performance rather than window dressing alone can offer a sustainable commercial advantage.

These three elements are interconnected; together they drive a realistic, commercially effective picture of building performance oriented to long-term occupant and social benefit. To form an holistic view, building owners must begin by considering broader objectives for buildings than simple compliance and certification. Without this ground on which to base a strategy, asset owners and managers will find it impossible to assess the true and relevant performance of the building.

Engagement with the building owner, operator and users will help to shape this. From there, a more holistic approach can help carry out the studies to understand and implement the strategy.

As transactional value is increasingly driven by market preference for buildings that offer economic, social and environmental value, so building performance value becomes more diverse than design certification or services operation. In addition, social media encourages users to share their experiences widely and to influence decisions based on actual experience against a perceived quality of design.

This will not affect just one transaction, but represents a sustained trajectory in rental income, occupancy and yield, building a picture of properties’ value when they go to market. Falling short of these expectations, especially in a maturing market with competition to provide what customers want, will mean underperforming assets face obsolescence.

We need to stop doing what we have always done or we run the risk that our existing or new-build assets will not be fit for purpose in future. With a rapidly evolving market and occupier base, that future is getting nearer all the time.

Austen Bates is an associate at TFT
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Related competencies include:
Sustainability
Digital detectives

The survey of a historic ashlar wall at Stirling Castle shows that digital documentation and data processing technologies can enable conservation professionals to detect defects automatically and accurately.

Alan Forster, Enrique Valero, Frédéric Bosché, Ewan Hyslop, Lyn Wilson and Aurélie Turmel

Historic Digital Survey (HDS) is a research project that is looking into the ways digital documentation and data processing can benefit the maintenance and repair of the traditional built environment. The project, conducted by the University of Edinburgh and Heriot-Watt University in collaboration with Historic Environment Scotland, aims to make use of point-cloud data to enable better monitoring, diagnosis, maintenance and repair.

Traditional visual approaches to condition surveys are time-consuming and still often include incorrect labelling, misdiagnosis and omission of defects. This is caused because surveyors differ in the way they report which is linked to their experience — or sometimes inexperience — and the compressed time frames for completing surveys. Providing accurate surveys is vitally important, though, as incorrect identification and diagnosis of defects can result in inappropriate interventions that ultimately undermine the fundamental conservation objectives they mean to support.

In this context, progressive implementation of digital documentation and subsequent application of innovative data processing tools such as machine learning (ML) algorithms could transform surveying, repair and maintenance.

Digital documentation in the form of laser scanning and photogrammetry along with bespoke, supervised ML algorithms could, for instance, benefit ashlar masonry defect detection. Masonry constitutes a significant proportion of the international historic built environment. In 2018, Historic Environment Scotland estimated there are 506,000 pre-1919 traditional — or historic — buildings in Scotland, ostensibly constructed in masonry and lime-based materials. Repair and maintenance expenditure for such a vast amount of buildings is therefore high.

Although there are many forms of masonry, ashlar is one of the most prominent around the world, associated with high-status architecture reflecting the time and cost associated with its construction. It is characterised as regular, square masonry with tight mortar joints of around 3mm and fine-tooled or polished visible faces.

Surveying historic ashlar walls effectively and efficiently is very time-consuming, given the number of individual masonry units and the need to label their individual condition manually. Furthermore, these surveys are prone to error as the identification and labelling of condition and decay mechanism can be complex, reflecting the variability in materials, exposure and build quality.

Case study: Stirling Castle chapel

As part of the HDS project, a digital approach was tested on the main facade of the Chapel Royal at Stirling Castle. The castle typifies ashlar masonry construction and experiences many of the defects most commonly encountered in natural stone by surveyors, such as erosion and discolouration due to salts or moisture.

The chapel, maintained by Historic Environment Scotland, was built in 1594. It is a category A listed building and a scheduled ancient monument. The architectural fenestration of the facade is characterised by a central doorway, flanked by coupled columns, and three Romanesque arched mullioned windows to either side of the entrance.

The first stage of the survey used digital documentation technologies to acquire...
data on the geometry and colour of the chapel facade (see Figure 1). Several laser scans were taken at approximately 10m from the wall, and a set of photographs taken to produce a 3D point cloud of the scene through structure-from-motion photogrammetric techniques.

Both point clouds, obtained from terrestrial laser scanning (TLS) and photogrammetry, were registered in the same coordinate system (see Figures 2 and 3). Colour information in the TLS cloud was then automatically replaced with RGB data from the photogrammetric cloud, as colour from digital single-lens-reflex cameras is of higher quality than that captured by the TLS device.

As a result, the point cloud is characterised by high-quality geometric data from TLS and high-quality colour data from photogrammetry. This point cloud was then automatically segmented into the individual ashlar units using a technique based on the approach detailed on p.31 of the May/June 2017 edition of the *Building Conservation Journal*. The approach has been implemented as free open-source software available at bit.ly/CyberbuildLab.

In parallel with this activity, professionals with expertise in stone defects carried out a comprehensive survey. This was reported in a context of stone deterioration patterns in an attempt to attain a common understanding of defects that were present. The survey adopted terminology outlined in ICOMOS-ISCS: Illustrated glossary on stone deterioration patterns (bit.ly/Stonegloss). During the surveying process, primary masonry defects were identified, including erosion, delamination, discoloration and mechanical damage. In broad terms, these defects reflect the identification of loss and gain of material and colour change.

Some 500 masonry units were manually identified and labelled on site, and 650 individual labelled defects were assigned by means of a tailored graphic user interface, as seen in Figures 4 and 5. The labelled defective regions were used as training data for the ML algorithm. Critical to any supervised ML algorithm is its reliance on such inputs, which are fed in to yield meaningful and accurate labelled outputs, which should correspond to the surveyors’ observations. As training data is only as good as the individual identifying and creating the inputs, expert surveyors were hired to collaborate on decisions.

Traditional visual approaches to condition surveys are time-consuming and still often include incorrect labelling, misdiagnosis and omission of defects.
Finally, the trained ML algorithm, based on a logistic regression model, was employed to survey the fabric, and decayed areas affected by both colour- or geometry-related deteriorations were detected and automatically classified. The major defect categories present in the surveyed facade were erosion, mechanical damage and discolouration (see Figures 6–8). The algorithm classified erosion patterns in areas with high moisture load — for example, at the base of walls — and areas of high run-off where there are defective rainwater goods and detailing. In addition, discolouration was associated with salts prevalent where the masonry dries at the base of the wall. Interestingly, the mechanical damage distribution was associated with gunshots, because the palace was at one time used as barracks.

The algorithm achieved an accuracy of 93 per cent in comparison to our meticulous manual survey conducted by experts. Its ability to identify specific areas of interest or defect types helps our understanding of defect distribution, and therefore diagnosis.

While the approach used at Stirling offers promising results, we must nonetheless highlight that the effective application of statistical models remains challenging, particularly because algorithms have to perform well in a general sense and not just in individual cases. It is clear that more data is required to test the algorithm, but that it will improve over time.

The repeatability of these digital surveys could also herald a paradigm shift in our capacity to monitor change in historic building fabric in an interoperable manner. In addition, the progressive use of data in point clouds will be more pronounced as historic BIM is used more widely.

The impact of artificial intelligence on work, a 2018 survey by the Royal Society and the British Academy, reflects a fear of jobs losses; however, the aim of using digital technologies in the built environment is not to replace the surveyor but to redirect their higher-order skills to add value to their work. This will move surveyors away from relatively mundane operations and redirect funds from surveying towards fabric repair and maintenance intervention.

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Dr Ewan Hyslop is head of technical research and science, Lyn Wilson is a digital documentation manager and Aurélie Turmel is conservation science manager at Historic Environment Scotland.

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Related competencies include:
BIM management
Building conservation accreditation
competencies include:
Diagnosis of defects

Working like a dog

Employing dogs is growing in popularity as a means of tackling invasive weeds

Helga Heylen

Never before have invasive weeds cost the environment, economy and taxpayer more. However, we have every reason to believe we can manage them better if we follow the trailblazing New Zealand government-funded model, where conservation dogs are the number one tool in detecting invasive species. No other method is nearly as fast, accurate, inexpensive and eco-friendly. The concept of conservation dogs originates in New Zealand, where these dogs are considered the primary tool in protecting biodiversity, closely linked to conservation.

Dogs do not rely on sight to identify invasives as humans do: the secret is in the snout. Conservation dogs are unsurpassed in finding infestations early by scent alone. Not only are their noses between ten and 100,000 times more sensitive than ours, they can work year-round in Europe’s temperate climate — a big improvement in efficiency from traditional methods that are season-dependent for the most part and rely on visual cues.

To understand their potential, it may help to think of other detection dogs, such as narcotics dogs working in airports. The Pentagon even used dogs to detect explosives in Afghanistan after first investing heavily in technologies, and the animals and their handlers proved far more successful.

Meanwhile, cadaver detection dogs — which are generally part of a different specialist search and rescue organisation, or charity called upon by the police — are fastest at locating human remains, and electronic sensors are still to be optimised to get even remotely comparable results. We might also think of medical detection dogs, sniffing out cancer at an early asymptomatic stage.

Nose to the ground

In Japan, knotweed is not invasive and grows in harmony with its environment, controlled by local insects and fungi. In the mid-19th century it was introduced into European gardens without its natural enemies, however, and when left unaddressed is not only a serious threat to ecosystems, crops, and structures such as bridges and roads, but it can also have a major adverse impact on the value of any affected property.

Of all European countries, the extent of the problem is best understood in the UK. Early detection is key to limit the time, money, resources and use of herbicide needed to get rid of it.

A study by Dan Jones, managing director of invasive plant species consultancy, Advanced Invasive, carried out on behalf of Swansea University, shows that managing Japanese knotweed costs more to deal with than all other invasives added together (bit.ly/3aP7fnF).

But why is control such a problem? The main issue lies underground with the rhizome, a tiny fragment of which can quickly create a new colony. This commonly happens when landowners or those working in construction move soil containing traces off site.

In Ireland, conservation dogs are trained to detect small fragments of Japanese knotweed — any part of the plant, in any season, even when dormant before it breaks the surface — and they can do so reliably down to a depth of 1m. Best for such field work tend to be high-energy rescue dogs, such as mixed breeds like labradorxbeagle, spanielxlabrador or an active dog that is considered ‘too much dog’ to be a pet. Other than searching sites, dogs in Ireland are also trained to check truckloads of earth, equipment and tyres for multiple scents. Dogs are a cost-effective, highly sensitive and non-invasive way to detect any part of the weed. They generally find targets up to 40 times faster than is possible with any other method. Trials show that what five people cover in eight hours, a dog does better in just one.

Dogs offer results instantly, with near–perfect accuracy. For terrain that is hard to access or densely overgrown, they can even work unleashed without a handler. Equipped with Bluetooth GPS harnesses, they log their stop-and-stare alert, allowing weed management teams to go in after with exact coordinates of the infestations. Dogs’ precision therefore greatly reduces the need for personnel, time and herbicide use.

Conservation dogs are ideal partners for the construction industry, helping with surveys and site clearance. They complement and speed up the work of surveyors, developers, ecologists and researchers in a thorough and cost-effective way.

Helga Heylen is managing director at Conservation Dogs Ireland helga@conservationdogsireland.ie

Related competencies include: Contaminated land
Raising the roof

If roof construction does not follow the relevant guidance then it can lead to a number of problems

John Miles
The roof is essential to any building: it separates the occupants below from the elements above, dealing with all weather conditions. A good roof will last more than a lifetime, and a bad roof can fail within weeks on being installed. In the UK, pitched roofs are the most common type because, with the climate, they are far more effective at shedding water than others such as a flat roof. The structure can vary depending on the location, material and building type; however, pitched roof construction is most frequently used for the main roof to domestic properties.

There are several kinds of pitched roof found in the UK.

- **Lean-to or mono-pitch roof**: this is the simple form of roof often used for small extensions. It should only span a short distance due to the thrust load imposed on the wall plate at the base of the roof.

- **Purlin roof**: this roof uses a purlin—a horizontal beam—to support the rafters, and is common on terrace houses.

- **King post and struts roof**: the king post and the struts offer additional support along with the purlins, and such a roof is often used where a larger span is needed.

- **Modern truss roofs**: these comprise units that are prefabricated in a factory, and are easy and efficient to install. They have become the most common roof type in new house construction.

Simple roof design can be undertaken by a surveyor using easily accessible resources, but complex designs need the support and guidance of a structural engineer.

Simple roofs in England and Wales follow guidance in Approved Document A and use Eurocode 5: *span tables for solid timber members in floors, ceilings and roofs for dwellings*, fourth edition, published by the Timber Research and Development Association (TRADA). All the figures within the TRADA document are based on roofing tiles or slates laid on timber laths over sarking felt. This guidance details not only the size of the timber but also the bracing and strapping for the wall plate and gables, and for various loadings allowed according to geographical location.

**Main defects**

We can assess the most common forms of defect by monitoring statistics from bodies such as the National House Building Council (NHBC). Claims made to the body are dominated by two elements: roofing and superstructure. More than 50 per cent of the former relate to problems with mortar—an issue that NHBC has been tackling since 2011, culminating in the most recent revisions to the Code of Practice for Slating and Tiling (CP 142), now enshrined in BS 5534: 2014 + A2: 2018 *Slating and tiling for pitched roofs and vertical cladding. Code of practice* (bit.ly/BS5534-2014).

This has resulted in new and replacement roofs using dry ridges and eaves as opposed to a mortar-bedded ridge. The mechanical fixing prevents the ridge tiles becoming loose and enabling water ingress or becoming dislodged. Although not mandatory, compliance with BS 5534: 2014 is not only considered best practice but also provides the strongest legal defence in the event of failures or disputes, and would be covered by Building Regulation 7 Materials and Workmanship.

Defects in pitched roofs are normally caused by three main factors: poor design, damp penetration, and failure of the roof covering. Other key issues include the following.

- **Inadequately sized roof members**: the TRADA tables give guidance on roof member sizes and spacing, however, care needs to be taken by designers and contractors to ensure the right size has been selected. Building control surveyors should check the size of the timbers on site and that structural timbers are marked, stating the structural classification, which is either C16 (a lower strength timber) or C24 (higher strength timber). Failure to select the correct one may lead to roof member deflection once under load. When undertaking re-roofing works, it is essential to check the existing roof structure to ensure it can take the additional load if a new type of covering is replacing it.

- **Overloading of the roof**: heavier roof coverings are often used when a roof is replaced, a common example being when lighter slate roofs are replaced with much heavier concrete tiles. The original roof may have been designed for slate and would not be able to support the additional load without modifications designed with the help of a structural engineer.

- **Roof spread**: this can occur when there is no lateral support to the roof. Traditional roofs with inherent purlins and a ridge beam have some lateral support as these elements are built into the surrounding wall structure. In trussed roofs, this support relies on galvanised steel restraint straps. It is essential these are installed since they add strength to the roof and their omission can cause the roof to move and the gable to become unstable.

- **Condensation or cold bridging**: this is normally caused by inadequate ventilation and insufficient insulation, and occurs predominantly when a roof is altered to enable a loft conversion. To prevent this, contractors must ensure that insulation is placed with a sufficient air gap to allow the roof to ventilate while remaining continuous around the occupied, conditioned spaces. Sufficient ventilation should also be provided to
the soffit of the roof. (For guidance refer to BS 5250: 2011 Code of practice for control of condensation in buildings.)

- **Inadequate pitch:** this is a common occurrence on lean-to extensions, as people wish to maximise the size of the extension under permitted development rights. These limit the height of the roof, which in turn limits the pitch; most modern roof tiles need a pitch of 18°, and slate tiles need a pitch in excess of 20°. Any roof covering needs to be installed according to its type and size, the pitch, the size of the lap, and the site’s exposure rating; further guidance should be sought from manufacturers and BS 5534: 2014.

One example of poor construction can be seen in picture 1 on page 27, showing a roof that has a dormer formed. When the roof was constructed it wasn’t set out correctly, which led to the wall plate being positioned incorrectly and alterations needed to the top course of masonry. It also shows that the junction of the roof and the dormer was poorly set out. Remedial work was required, at this stage this would be to remove and reset the timber work, or to obtain a structural engineer’s assessment to ascertain that the roof was structurally sound.

A second example (see picture 2 below) shows a poorly designed dormer with insufficient batten trimming around the dormer construction. This was picked up on site by the surveyor, and the contractor was asked to provide an arrangement in accordance with the requirements of the TRADA tables and the design made by the structural engineer.

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**Simple roof design can be undertaken by a surveyor using easily accessible resources, but complex designs need the support and guidance of a structural engineer**

**Competency evidence**

The processes discussed above and the assessment of the design, risks and remedial work count as evidence towards the following competencies on the Building Control pathway of the APC.

- **Building control inspections:** if the work involves site inspections to ensure that installations meet relevant performance requirements, and also entails the ability to observe, assess and take action against contraventions on site, then it would normally demonstrate Level 2 of the competency. Where remedial works are required and reasoned advice is provided, the candidate could achieve Level 3.

- **Building pathology:** by understanding defects analysis and explaining building fabric failure to identify potential risks, to offer advice, and to highlight, for example, incorrect drainage installations, drainage failure and its causes, as well as the remedial works required, the candidate can demonstrate achievement of Level 3.

- **Construction technology and environmental services:** work can be used to show understanding of the design and construction process and being aware of construction solutions to problems.

- **Works progress and quality management:** work can demonstrate knowledge of construction technology techniques and their relevance on site.

While roof construction can appear simple, defects can soon occur if the design and construction is not properly considered. Surveyors should understand timber loadings, spans and the pitch requirements of various materials when designing roofs. They should also take this knowledge to site to ensure that the specified components are installed on site and any incorrect working practices are identified.

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**Related competencies include:**
Building control inspections, Building pathology, Construction technology and environmental services
A rounded education

Whether working on projects or her studies, one trainee building surveyor has seen success in a variety of different areas, as the fifth in our series on apprenticeships explains.

Jordanne Wilson

Recently, my workload and projects have been immensely diverse. They have ranged from reviewing the leases of 85 logistics properties, in order to ascertain the landlord’s exact insuring obligation and liability, to the early stages of a new roofing project for a large multi-let office facility. I have also been involved with preparing multiple contract documents on a number of projects, including a car park refurbishment and landlord improvement works to a retail park unit.

The project mentioned in my previous article regarding a burst water main underneath a high street retail unit has also finally drawn to a close. It was something of a learning curve given the elusiveness of the leaks and the perseverance sometimes required when diagnosing defects. The project also provided unforeseen opportunities for collaboration with consultants and utilities companies, allowing me to develop my competency in building pathology as well.

I have continued to work on planned maintenance programmes to improve my experience and, in several instances, moved on to review premises with property and facilities managers. Doing so has enabled me to view maintenance and repair work from both a commercial and a landlord’s perspective, and has given me an insight into how I can improve the information and reports I provide in future to fulfil the client’s needs.

I have also identified licences for alteration as an area in which I want to gain more experience. As a result, I was quickly able to get involved in a few instructions, one being a retrospective licence to install a mezzanine and another for an incoming tenant’s fit-out works. The latter conveniently tied in with certifying the same tenant’s dilapidations works for a previous unit, on which I also prepared the schedule of dilapidations.

I have spent some time revising my knowledge of measurement standards by comparing and contrasting gross internal area (GIA) as described in the RICS Code of Measuring Practice sixth edition and International Property Measurement Standards (IPMS) 2: Retail, in order to determine the differences between the two, and how this relates to the measurement methodology used for reinstatement cost assessments. While the differences between the two standards are minimal, there are some stipulations made in the IPMS that are not addressed in GIA and vice versa, which are important to note when undertaking measured surveys and reinstatement cost assessments.

At the time of writing. I have also just finished the first semester of the second year of my degree with Birmingham City University, which came and went far too quickly. However, it culminated in the successful submission of my Built Environment Technology 1 assignment, for which I was awarded a first — my highest grade yet — scoring 89 out of 100, which I was thrilled about.

Perhaps even more exciting are my final two modules for the year: Design & Surveying Skills and Professional Environmental and Materials Science. The former has seen me pick up my pencils, something I haven’t done since GCSE art, to learn hand and orthogonal drawing skills and observational measurement. I have enjoyed this immensely and I feel it has already influenced and improved the way I record my site notes. The latter encourages innovation and curiosity about materials and technology and the way various design aspects such as thermal comfort and light affect a building and its occupiers. I am especially looking forward to the showcase at the end of the semester in which my group and I will exhibit what we have learnt in whatever imaginative way we choose.

A recent CPD event held by Eversheds, which provided an update on case law in 2019, was another highlight and brought some interesting modern cases to the fore, including Fearn v The Board of Trustees of the Tate Gallery [2019] EWHC 246 (Ch) and Neocleous v Rees [2019] EWHC 2462 (Ch). I also had the privilege of sitting on a round-table discussion for the March 2019 edition of Modus, which discussed whether there was a disconnect between surveying degree courses and the requirements of the profession. I personally feel that this is not the case, but I encourage people to read the discussion online in full as many great points were raised (rics.org/thegoodissue).

Jordanne Wilson is an apprentice building surveyor at Savills
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