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ISSUE 206 | WINTER 2025

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Power in data and resilience

The pace of change in the world today is undeniable. Climate change continues to shape our environment, with events such as cyclones, hurricanes and flooding becoming increasingly common. Earthquakes remind us of the dynamic nature of our landscapes, while advancements in technology, including AI, open up new possibilities and challenges. These shifts ask us to rethink and adapt, ensuring we remain prepared for what lies ahead.

Aotearoa New Zealand's built environment, and indeed *Build* magazine, are responding. *Build* magazine is on its own transformational journey, moving towards becoming fully digital next year – a shift that will bring the benefits of more targeted, timely and engaging content.

As guest editor for this issue, I'm delighted to introduce our data and resilience features. BRANZ CEO Claire Falck emphasises the increasing importance of accurate data (page 6), which is reflected in the launch of BRANZ Build Insights. This online tool consolidates trusted data from across the sector, empowering businesses to make informed decisions and contributing to a stronger industry overall (page 44). Continuing with the data theme, we explore expert insights into how big data and advanced analytics are shaping smarter decision making for the future. There are also updates on AI's role in improving consent processes (page 50) and progress on the creation of a national carbon database to help designers prioritise low-carbon choices (page 55).

In the resilience feature, we showcase new tools and resources to support a more resilient built environment in the face of earthquakes and climate change. There's also plenty of practical advice on a range of topics, from warm roofs (page 26) to proposed changes to using overseas products (page 74) and consent requirements for small standalone dwellings (page 80).

It's a jam-packed issue – enjoy!

Ngā mihi nui

Rhys Hurd
BRANZ GM Communications, Engagement and Channels

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BRANZ's vision
Challenging Aotearoa New Zealand to create a building system that delivers better outcomes for all.

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OPINION

Trust data – nothing but the facts

In this bewildering era marked by significant global uncertainty – political, economic and social – BRANZ CEO *Claire Falck* believes the need to rely on accurate data has never been more critical for the building and construction sector.

Wars, trade wars, tariffs and protectionism dominate the headlines, and we wake each morning unsure whether what we believed to be true yesterday will remain so today. Due to the warp speed of change, our increasing dependence on social media and the lack of time to find and check facts, our views on all manner of topics can often be shaped by conjecture, speculation and plain misinformation.

Data please, not distortion

This situation is not unique to the building and construction sector, but the impact of anecdotal feedback as opposed to data-driven insights can have far-reaching consequences. For instance, rumours about material shortages or misunderstanding of regulatory changes might lead to panic buying and artificial price inflation. Or speculative media reports about labour shortages might discourage investment in new projects, in turn leading to job losses and reduced economic activity.

We need facts and reliable data. By prioritising data-driven decision making, stakeholders can mitigate these sorts of risks and foster a more stable and predictable environment – even when the world at large is less than predictable.

Just how healthy is the sector?

A good illustration of this point would be holding up a mirror to the sector itself. I would hazard a guess that, if you did a straw poll asking about the state of the building and construction sector in New Zealand right now, the responses would be overwhelmingly negative.

Every day, we read or listen to reports about skyrocketing costs, building firm liquidations, product failures, consent delays and a negative long-term outlook. This influences how people – even within the sector – view its performance.

And yet, when we look at the data, the truth is far more nuanced – and positive in some cases. You just have to get the data together. Until now, that has been difficult to do, but BRANZ has just made it so much easier.

BRANZ Build Insights – comprehensive, efficient and reliable data

You will read more about BRANZ Build Insights in this issue (see page 44). This new tool provides an instant snapshot about what's happening in the building sector, sourced and carefully collated from reliable data.

Build Insights tracks building system data, analyses it and presents practical insights that support the industry to plan, to identify trends and to better predict things like build delivery and consenting times, among many other uses.

In terms of myth-busting negative sector perceptions, in the first quarter of 2025, Build Insights uncovered some vital green shoots emerging. For example, the number of building consents issued for stand-alone homes has been slowly increasing – hitting 15,975 in the 12 months ending March 2025, an increase of 5% from the 12 months ending March 2024.

Importantly, the data identifies clear trends that will enable industry actors to plan accordingly. For example, the fact that new builds are progressively getting smaller in response to higher building costs will be of particular interest to architects, designers and group home-building firms.

More data (and opportunities) to come

BRANZ will continue to incorporate additional reliable data sources so Build Insights increasingly will become a one-stop shop for accurate, wholesale industry data.

The tool is not just immediately useful – it has huge potential too. Imagine if we could start tracking instances of product or building system failures to enable earlier interventions to occur or foresee and prevent workforce shortages before they happen.

BRANZ understands that data is not just about numbers or trends. It's about outcomes. And these are the sort of issues and opportunities we believe data – and BRANZ Build Insights – will help us solve.

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OPINION

Resilience in the built environment – a necessity for the future

Aotearoa New Zealand's built environment is under pressure to respond to modern needs and societal expectations, says *Paul Campbell*, National Technical Leader – Building Structures, WSP.

In an era of rapid urbanisation, climate change and increasing natural disasters, resilience has become increasingly critical. The Resilient Buildings Project showed there is a shortfall between societal performance expectations and what the New Zealand Building Code delivers – it's time to critically review our resilience.

Resilience is often defined as the ability of buildings, infrastructure and communities to withstand, adapt to and recover from adverse events. Importantly, resilience needs to consider the built environment and people and communities. It's not just about surviving disasters – it's about thriving in the face of challenges.

The hazards we face

New Zealand's unique geography means earthquakes, tsunamis, flooding, volcanic activity and other natural hazards can happen at any time. Within each of these hazards, there is a spectrum of severity. The government discussion document *Strengthening New Zealand's emergency management legislation* laid out the 50-year likelihood of various potential natural disasters. Examples include the most likely being a Cyclone Gabrielle-equivalent event (80%) or a magnitude 8 Alpine Fault earthquake (75%) through to less likely events such as a large Taranaki eruption (1%) and a magnitude 9.1 Hikurangi subduction zone earthquake (1%).

What the New Zealand regulatory system delivers

The New Zealand Building Code is performance based and primarily focused on life safety with a basic level of amenity rather than comprehensive asset protection and resilience. The Code sets a legal minimum performance, yet it is often treated as a premium standard to be achieved. Consumers and designers can choose to do better than Code minimum. Resources like *Low damage seismic design* and *Earthquake design for uncertainty* give designers advice when going above Code minimum (see page 64).

The power of individual choice

Small resilience choices we make individually contribute significantly to social and community resilience. Whether it's choosing a simple repairable layout, choosing lightweight cladding to decrease seismic weight or making your foundation system able to be relevelled, these decisions add up to create a more resilient built environment.

Enhancing the resilience of existing buildings is more challenging but achievable. Restraining water tanks, adding additional bracing to the subfloor or choosing resilient materials such as flexible vinyl over rigid tiles make a difference.

The crucial step individuals can take is to understand what performance they want versus what the regulations require and make informed decisions of Code or above-Code performance.

Affordability of resilience

Housing affordability in Aotearoa is an issue. Getting reliable cost information for designing beyond Code is difficult. US studies indicate that the cost premium for seismic resilience is low and that a 50% increase adds an estimated 0–2% to cost, depending on building type. A New Zealand study found the premium was 0.5–1.5%. Some resilience enhancements such as simplifying building form may be cost neutral or even a saving.

The future of resilience

As we face future challenges of climate change, population growth and housing densification with an ageing built environment, we will need innovative and adaptive strategies. You have the choice on your next project to make informed Code versus beyond-Code performance decisions. You may choose not to design for the extremely rare event, but imagine if we all designed for the more common events to cause less damage.

We all have the power to influence a more resilient future.

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Sector round-up

Recent events and highlights from the building and construction industry here and around the globe.

AI is embraced

AI is changing the face of cities and infrastructure.

A recent global survey shows that Australian engineers, architects, city planners and digital leaders, along with their counterparts in 10 other countries, are increasingly integrating artificial intelligence (AI) into their work. Almost a third of the Australian respondents (32%) use AI daily – closely mirroring the global figure of 33% – and 85% use it at least once a week. This study, commissioned by global sustainable development consultancy Arup, highlights how AI is already shaping Australia's cities and infrastructure.

The report *Embracing AI: Reshaping Today's Cities and Built Environment*, explores how professionals in Australia, Brazil, China, Germany, India, Indonesia, Nigeria, Singapore, the UK and the US are leveraging AI to change the way cities and infrastructure are designed. In Australia, the most common applications of AI are in design, developing digital twins and supporting research and development.

The survey also found that users are moving beyond basic AI tools such as chatbots and large language models like ChatGPT. In Australia, for instance, around 40% of the respondents are already utilising AI for advanced tasks such as large-scale simulations, machine learning-driven data analytics and science-based AI to address complex projects.

Using AI to help in developing digital twins.

Australian professionals in the built environment sector are particularly optimistic about AI's potential, with 73% viewing it as an opportunity – well above the global average of 60%. Concerns about job losses remain low, with only 12% seeing AI as a threat to employment. Many believe AI can help deliver projects on time and within budget as well as address environmental challenges such as climate change. They see AI's potential in reducing waste, developing sustainable materials and optimising renewable energy solutions.

Arup is already deploying AI-powered tools to enhance the expertise of its technical teams. These tools have been used to model nature-based solutions for protecting communities from heatwaves and floods in Sydney, Melbourne and Brisbane. AI is also extending the lifespan of critical infrastructure such as offshore wind turbines and bridges, thereby reducing costs and carbon emissions.

Calling for increased focus on developing AI tools that can help decarbonise the sector and restore nature, while delivering prosperity and resilient infrastructure for a growing global population, Arup noted that, if just 10% of the $252 billion corporate investment in AI in 2024 was dedicated to addressing major challenges in the built environment, it could radically transform the sector and improve people's lives.

UC boasts world's only modular quake simulator

The University of Canterbury | Te Whare Wānanga o Waitaha (UC) Structural Engineering Laboratory now houses the only system that allows researchers to assemble and disassemble shaking platforms – much like a Lego set – to test structures required to withstand high-intensity earthquake shaking.

UC Civil Engineering Professor Santiago Pujol says the facility is a ground-breaking tool for advancing seismic resilience. 'The challenge with civil engineering is that you can't test-drive a building before an earthquake. Computer simulations have limitations, and there is always uncertainty about how structures will behave under real seismic demands.

'This system changes that. We can assemble test structures piece by piece, attach structural components to independent shaking platforms and simulate realistic earthquake demands. Using a network of powerful hydraulic actuators that move at high speeds, the system lets us shake entire structures or parts of structures.

'For example, we can move floors independently of each other to simulate what occurs in a multi-storey building without having to test the entire building. That allows us to evaluate the integrity of ceilings, sprinklers, pipes and fire-safety systems.'

UC Civil Engineering PhD candidate Liam Pledger is using the facility to investigate the benefits of stronger, more robust building structures and their impact on non-structural components compared to less robust structures. His goal is to better understand which types of buildings are most vulnerable to damage – both structural and non-structural – during large earthquakes.

'Following the Canterbury and the Kaikōura earthquakes, many buildings sustained widespread damage to non-structural components like sprinklers, ceilings, plasterboard walls, heating, ventilation and air conditioning systems. The new modular earthquake simulator allows us to test these non-structural components using realistic floor demands, in a way that has never been done before.'

From the heights

A 3D printer has been used to construct a military bunker at 11,000 feet in the Himalayan mountains.

Simpliforge Creations and IIT Hyderabad have completed a 3D printed military bunker at 11,000 feet in Leh, India. The bunker was constructed in collaboration with the Indian Army and marks the first on-site 3D printed military structure built in high-altitude, low-oxygen conditions using locally sourced materials.

The structure was printed in 14 hours using Simpliforge's robotic 3D printer, which was deployed and commissioned in under 24 hours.

Material science played a crucial role in the project's success. Operating at high altitudes with thermal extremes required specially engineered concrete, with the project team testing and optimising a mix suited to local aggregates and environmental stresses. This innovation was key to ensuring structural strength and durability.

The project demonstrates how 3D printing technology can provide rapid infrastructure solutions in extreme environments. Using local materials and completing the structure in days rather than weeks highlights potential applications for remote construction challenges.

The Himalayas – a testing ground for 3D printing.

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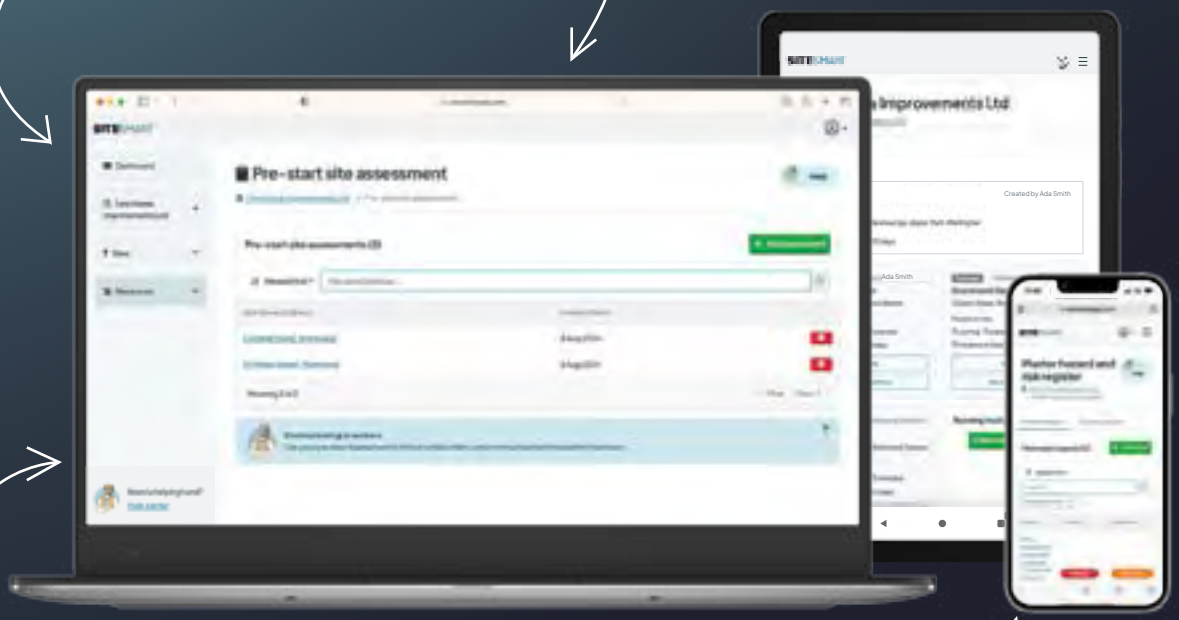

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ECONOMIC INSIGHTS

By Matt Curtis, BRANZ Economist

Highlights from the latest analysis from Build Insights, BRANZ's new tool to track building system data (see page 44 to learn more).

What Q1 2025 data shows:

- **Reduced section prices:** The average 500 m² section is $240,000 – $35,000 less than in mid-2022. There are, however, significant regional variations: For instance, the average cost of a 500 m² section in Auckland is over $505,000, compared to $65,000 in the West Coast.
- **Reduced overall new-build cost:** The total average price for a section and new build standalone house is $1,018,000 – $42,000 less than $1,060,000 in December 2024.
- **Construction costs outstrip inflation:** The cost to build a house has increased by nearly 20% since mid-2022, with an average 200 sqm house now costing $777,000. Over the same period general inflation rose 12%.
- **Shift in consents:** Building consents for stand-alone houses have increased slightly, whereas consents for attached dwellings have decreased by 10% between the year ending March 2025 and the previous year.
- **Decline in consent value:** The total value of residential building consents has fallen by 13% compared to 2023 after adjusting for building cost inflation.
- **Increase in construction businesses:** There are now more construction businesses than ever before – 81,891 in 2024 outpacing the growth rate of all industries in the last decade. However, construction business liquidations were up 37% and made up 31% of all business liquidations.
- **Positive long-term outlook:** Despite the economic downturn, the long-term outlook remains positive, with more construction businesses being started and fewer ceasing operations compared to other industries.
- **Surge in apprenticeships:** Carpentry apprentices have more than doubled in the past decade, with 21,165 apprentices in 2023 compared to 9,280 in 2014.
- **Increase in trades training:** This has nearly doubled since 2014, with the total number of trainees, apprentices and tertiary qualification students in construction increasing from 57,000 to 93,000 in 2023.

FOR MORE

Full report here: branz.co.nz/buildinsights

BRANZ buildinsights

Construction workers on bamboo scaffolding, favoured for being lightweight and faster to erect and dismantle.

Bamboo's had its day

Bamboo scaffolding is on the way out in Hong Kong.

The iconic bamboo scaffolding on construction sites familiar to many travellers to Asia will be gradually phased out in Hong Kong and replaced with metal scaffolding.

Citing safety concerns, the Development Bureau announced it will drive wider adoption of metal scaffolds in public building works, replacing bamboo with a sturdier material. According to quoted official figures, 23 people have died from bamboo scaffold-related accidents since 2018. However, bamboo has long been the favoured material for framing constructions and building repairs, dating as far back as the Great Wall of China.

Much of the city's skyline owes its construction to this pliable, fast-growing wood, and it is preferred for being lightweight, easy to transport and store as well as faster to set up and take down, even in tight spaces. It is estimated that almost 80% of building scaffolds in Hong Kong are made of bamboo.

The Association for the Rights of Industrial Accident Victims has supported the government's decision, urging private projects to follow suit in decreasing the use of bamboo scaffolding.

LEED update

The US Green Building Council has released LEED v5, the latest version of its Leadership in Energy and Environmental Design green building programme. This version focuses on steps to deliver ultra-low carbon buildings by targeting emissions reduction across all aspects of the building life cycle, including operations, embodied carbon, refrigerants and transportation. Buildings in Aotearoa with a LEED rating include Auckland Airport and Massey University Albany campus.

All LEED v5 projects will complete an operational carbon projection and be given tools to craft a comprehensive, long-term carbonisation strategy. Quality of life credits focus on human-centric strategies to address the health and wellbeing of the communities where the buildings are located.

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Call to consider wood

There's been a call for the government to include wood in its directive about using wool.

The Wood Processors and Manufacturers Association of New Zealand (WPMA) is calling on the government in its directive about using wool fibre to consider wood in the construction and refurbishment of government buildings. The government recently announced that all government agencies should prioritise wool where practical and possible in government buildings.

'The wood products that we are talking about are not only renewable but have economic and environmental advantages when it comes to carbon storage and supporting our rural communities,' says Mark Ross, WPMA Chief Executive. 'With New Zealand's sustainable forestry model, using locally grown wood products incentivises our circular bio-economy, boosts New Zealand's domestic wood processing industry, and supports our drive to meet our climate change targets.'

Forecasting by Deloitte indicates that changing the market share to wood products by 25% would result in the removal of an additional 920,000 tonnes of carbon dioxide from the environment each year. Greater use of timber in domestic building and construction is critical to rebuilding New Zealand's economy and providing regional jobs in a highly productive sector.

As an example, engineered wood products such as cross-laminated timber and glulam offer multiple benefits to New Zealand, including reduced construction time, lower carbon footprint and excellent thermal performance compared to traditional building materials like concrete or steel. Mass timber has gained recognition for its versatility and is increasingly being adopted globally in residential and commercial construction projects.

WPMA wants the government to align the wool directive with wood in the consideration of using wood fibre products in the construction and refurbishment of government buildings.

IN BRIEF

BRANZ campus redevelopment wins gold

The BRANZ campus redevelopment won gold in the industrial project category at the 2025 New Zealand commercial project awards hosted by the Registered Master Builders Association. This recognition highlights the innovation, collaboration and technical expertise behind the transformation of the campus. The project included the staged demolition of existing structures and the development of cutting-edge facilities – a fire laboratory, structures laboratory, and a new administration building – all purpose built to support world-class research and testing.

Green light proposed for granny flats

Broad changes to the rules governing council oversight of housing under the Resource Management Act have been released for public discussion. Under the proposed changes, granny flats up to 70sqm and papakāinga with up to 10 homes would be allowed without consent, subject to certain conditions (see page 78).

Showcasing real-world research

In May, delegates from around the globe converged in Indiana, US, for the prestigious International Council for Research and Innovation in Building and Construction (CIB) World Building Congress. This global event centred around the theme of a sustainable built environment and the pivotal role of the construction community in achieving the UN Sustainable Development Goals.

Representing Aotearoa, BRANZ GM Research Dr Chris Litten took the stage as a CIB board member, delivering a talk on the BRANZ approach to creating real-world impact from BRANZ's research – including REBRI Construction Waste Toolkit and NEXT Homes.

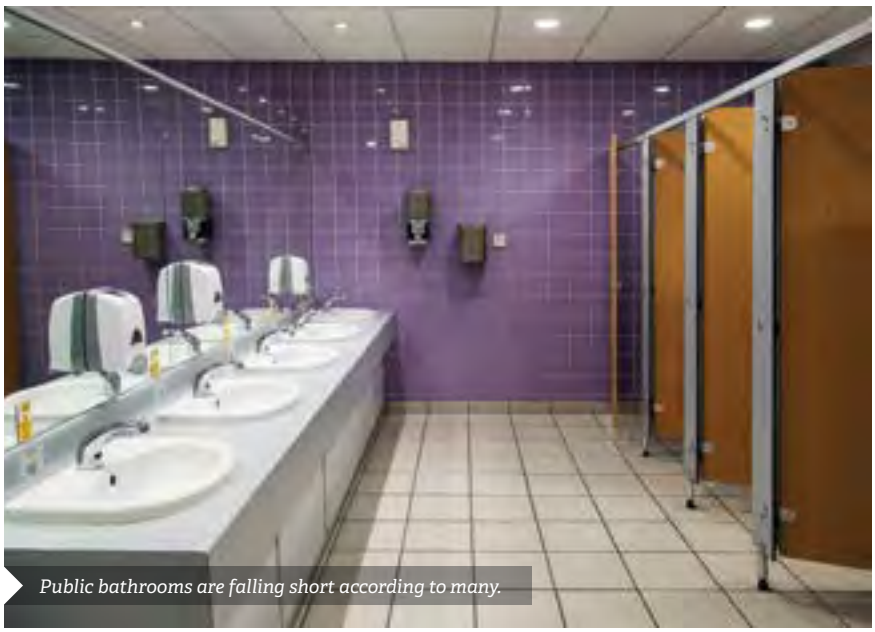
What they said…

'We're often the ones who come in later to clean up. We understand how council processes work and where the documentation falls short … Architectural courses are traditionally very conceptual. There's minimal focus on compliance or understanding the Building Code. That disconnect shows up when the designs hit the approvals process.' – *David Clifton, New Zealand Institute of Building Surveyors President.*

'The RMA is broken, and it's a big part of the reason for many of New Zealand's biggest problems with infrastructure, housing and energy.' – *Chris Bishop, Minister Responsible for RMA Reform.*

'We can see some green shoots coming through in the data we get, such as increases in the volumes of concrete and steel going on, and the volume of trade going through merchants.

That tells us activity is starting to pick up, but winter is often tough in this sector because of weather impacts, so we don't think we'll see improvements really kick in until spring, so from about September.' – *Julien Leys, Building Industry Federation Chief Executive.*



Public bathrooms are falling short according to many.

Loo review

Public bathrooms falling short of expectations.

More than 3,000 people had their say on the state of public and commercial bathrooms, with results from WSP and BRANZ's loo review showing strong evidence for change. The study was part of a WSP study funded by the Building Research Levy that also included a literature review and targeted stakeholder consultation. The aim was to assess whether bathrooms in public and commercial buildings – such as libraries, sports centres, museums and eateries – are meeting people's needs.

For many, they're not. One in five respondents said public bathrooms don't meet their needs – a figure that jumps to nearly half for those with a disability. A third said they often have to wait to use the bathroom – especially women, parents and people with disabilities. One in five also reported feeling unsafe using public facilities.

WSP team leader for human factors and social sciences Leoni McKelvey says the feedback paints a clear picture of what's working – and what isn't. 'Two out of three people told us that the availability of a public bathroom affects their decision about where to go. That has real implications for inclusion and access, especially for those with health conditions, pregnant people, families or anyone in a vulnerable situation.'

The research also sought views through a stakeholder group, which identified barriers to improvement, including cost, a lack of understanding of users' needs and outdated standards in the Building Code. The bathroom standards haven't been updated in 30 years.

Leoni says current guidelines are based on work done in the 1990s – a time when the workforce and demographic make-up were very different. Since then, society has seen significant shifts, including an ageing population, greater gender diversity and more women participating in the workforce. Traditional household roles have evolved, and yet our public bathroom infrastructure has not kept pace.

WSP's final report includes a raft of recommendations for MBIE to consider, including revising MBIE's toilet calculator used to determine the number and size of bathrooms in a building and introducing more flexible bathroom labelling at certain venues.

MBIE was involved throughout the review and is now considering the recommendations.

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FROM THE BRANZ HELPLINE

Alternative Solution for parapet and enclosed balustrade-to-wall saddle flashings

In this issue, we address a common question around the detail in the Acceptable Solution.

We're talking about Acceptable Solution E2/AS1 6.4.1 and Figures 11 and 12. However, a scenario not covered is when the balustrade/parapet is continuous and in plane with the adjacent wall surfaces of the building it adjoins.

The details addressing this scenario are outside the scope of E2/AS1 and need to be treated as Alternative Solutions.

Questions often come from builders facing on-site issues, suggesting that designers didn't submit relevant details on the consent application and the omission was missed by the processing officer.

This is not a simple, straightforward junction to detail, and there are many variables at play. These include the multitude of cladding options, alterations/additions and new builds, existing direct-fixed cladding abutting cavity cladding systems and different wind zones/climatic environments. It's no surprise that it must be addressed by a correctly designed and consented Alternative Solution.

These details must be addressed at the design and documentation phase. A standard saddle flashing is relatively complex anyway and best constructed in one piece with welded joins, but an in-plane aspect to one side will always complicate things further with additional overflashings, modifications to the capping and hook edges potentially required. Builders often find a solution on site, but they should really contact the architect/designer to determine the flashing solution required.

Leaky building research has shown these junctions have been prone to failure. In-plane junctions require specific design of flashing arrangements.

An in-line junction is one option for the Alternative Solution modified saddle flashing, but it needs to be considered earlier in the design process. In-line junctions are always more difficult to execute seamlessly – especially in retrofit work – so the other option is to design them out. One small offset step in the façade/balustrade and the standard E2/AS1 saddle flashing details become your Acceptable Solution.

FOR MORE

Acceptable Solution E2/AS1 6.4.1

Homes that star

NZGBC says 6 Homestar homes save money.

An Infometrics report commissioned by the New Zealand Green Building Council (NZGBC) shows homes built to a 6 Homestar standard can save New Zealand homeowners over $62,000 in electricity and mortgage interest over 30 years – the equivalent of helping them become mortgage free 2 years earlier.

The report *Analysis of financial benefits of Homestar* shows that despite an upfront increase of 0.5–1.5% of average building costs, Homestar homeowners can save $6,800 in interest in just 5 years thanks to discounted mortgage rates such as ANZ's Healthy Home Loan package. These discounts, which amount to an effective 0.25% discount off widely available mortgage rates, save households over $40,000 across a typical 30-year loan.

Add in lower power bills – up to $1,500 a year by 2050 – and the savings stack up. Electricity and interest savings combined range from $62,800 for a terraced house in Auckland up to $98,800 for a standalone house in Wellington over the life of the loan.

'This report confirms what we've long known – building better homes is a win for healthier New Zealanders, the planet, and now are clearly more affordable in the long run,' says Andrew Eagles, NZGBC Chief Executive.

'With the right support from banks and government, we can make these homes the norm, not the exception.'

BRANZ's view on new self-certification scheme

Self-certification scheme must not come at the cost of quality.

The government's announcement that trusted house builders and tradespeople will be able to sign off their own work under a new self-certification scheme has been supported by BRANZ, provided it does not come at the cost of quality.

BRANZ's view is that technology will play an increasingly important role in building confidence in the process. For council inspectors, technology streamlines workloads and reduces travel time. Homebuilders benefit from faster consents, lower costs and reduced liability through better documentation and transparency. Homeowners gain confidence in the quality of work, which will build greater trust and satisfaction.

The government has also given building consent authorities the autonomy to decide on a case-by-case basis between remote inspections or in-person site visits. BRANZ's prediction is that more inspections will be done remotely in the future with opportunities to reduce travel time and enable inspectors to consent across different areas. This will reduce the backlog of work and allow better productivity.

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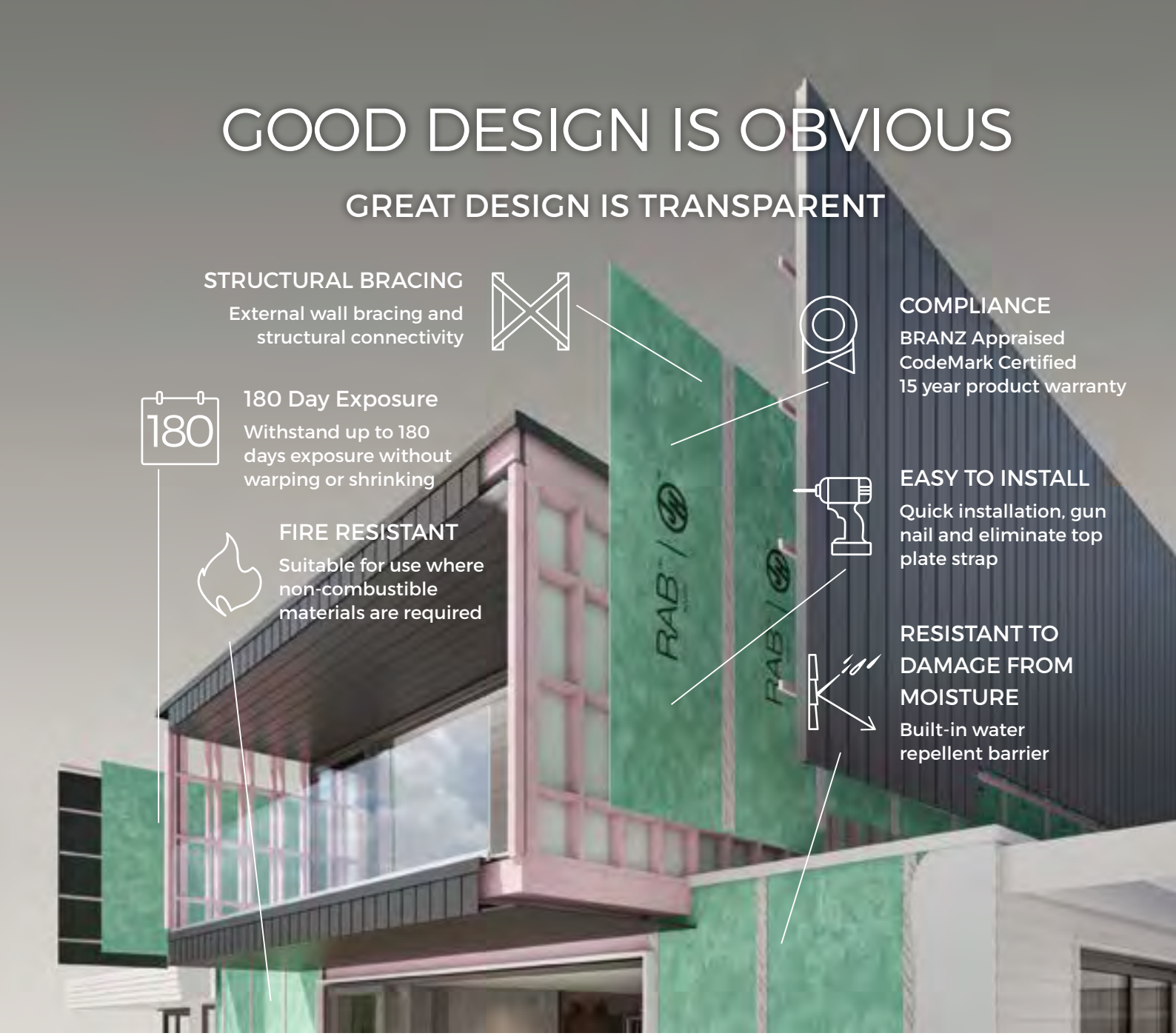

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The problem solver

If you're a designer or builder in need of advice, chances are you've been on the phone with BRANZ helpline technical advisor *Phil McNamara*. It's a responsibility that Phil relishes – knowing he's backed by expert colleagues, 25 years of hands-on building experience and an appetite for continuous learning.

BRANZ helpline technical advisor Phil McNamara.

Q. What is your background and how did it prepare you for your role fronting the BRANZ technical advisory helpline?
I was a builder in Wellington for 25 years before joining BRANZ. I went through the usual qualification route, starting my apprenticeship with my father (one of seven builders in my extended family!) then finishing with another building firm. I worked on a wide range of projects, from semi-commercial to renovations and new builds, which all have different challenges.

Across my career, finishing was always my favourite part. I've always been a bit of a perfectionist, so I enjoyed the accuracy required. I was very proud that one of the projects I worked on a few years ago received the Registered Master Builders Supreme Award. I loved that higher-end stuff where there was an opportunity to use unusual materials and apply your knowledge and skills. If there was a tricky job, I liked to be involved. I like problem solving.

Q. Did that enjoyment of problem solving lead you to BRANZ?
Well it helped! But it was actually an injury that took me off the building site. A couple of years ago, I was recovering from shoulder surgery and looking for a new opportunity and it so happened that BRANZ was looking for someone to temporarily cover the helpline role. I found that I really liked it. My body wasn't getting any younger, so I decided it was time for a permanent change. It worked for BRANZ too, so here I am!

Q. Is there a typical day on the phones?
Not really. There's a lot of day-to-day variety. Some days, I'll get only five calls, and on other days, it might be 30. Some calls I can answer in 2 minutes and others will take all day.

In my time here, the H1 changes have really dominated. I get so many enquiries about that – callers looking for clarification of the requirements and how BRANZ interprets them. Overall, H1, E2 and NZS 3604 make up the bulk of enquiries. They would typically account for 80% of my calls each day.

There's also an uptick in calls whenever BRANZ releases a new tool like the H1 calculator, for example, or whenever MBIE announces changes such as the new rules around granny flats.

Q. Did it require a lot of upskilling?
Definitely! But I'm in the right place for that. I read a lot of material based on

BRANZ's extensive research. I've found that I have a real appetite to read up on a whole lot of subjects, which differs a bit from building, where most days I was so tired after work I didn't have a lot of energy for upskilling.

I now understand a lot more about why I was building things the way I was when I was on the tools. For example, I understand the importance of installing insulation correctly and how framing timber acts as a thermal bridge. Once you're interested in a subject, the learning – the appreciation of why things should be done in a particular way – becomes a pleasure. That's the greatest reward for me.

Q. Do you ever get stumped by an enquiry?

Absolutely! But I do have the advantage of knowing a little bit about a lot of subjects, so I can usually understand what a caller is referring to and know where to go looking for help. That might come from someone else in BRANZ, where we have amazing experts who are passionate about what they do and genuinely want to assist. And if they can't help, they can usually guide me – sometimes outside of BRANZ.

There are occasions where we simply can't help. For example, we've had callers involved in legal cases over a building or construction issue and they're looking for us to back them. Or we have callers looking for product advice or where to find the best prices. We can't ever compromise our impartiality, but if we can't help directly, we will always do our best to suggest other places to try.

Most of the advice I pass on is straight from our own research, so it's clear cut. It's evidence based and backed by our world-class expertise. And if we don't have that evidence, I'll say so.

Q. Do calls ever get tricky?

The vast majority of callers are respectful and polite. They're genuinely looking for assistance and appreciate that we're doing our best. Only once or twice can I recall someone calling in with all guns blazing. You learn how to manage those. A lot of times, people just want to be heard. Listening is a big part of my job.

Q. How do you spend your time outside of work?

I do love my sport, but right now, life revolves around my family. I have two young girls – and that lifestyle is very different from my old sporting days!

I have a large extended family, many of whom are or were builders. They have their own ideas, so there's been lots of building talk at family gatherings over the years.

BRANZ advisory helpline – free phone 0800 80 80 85 during normal business hours.

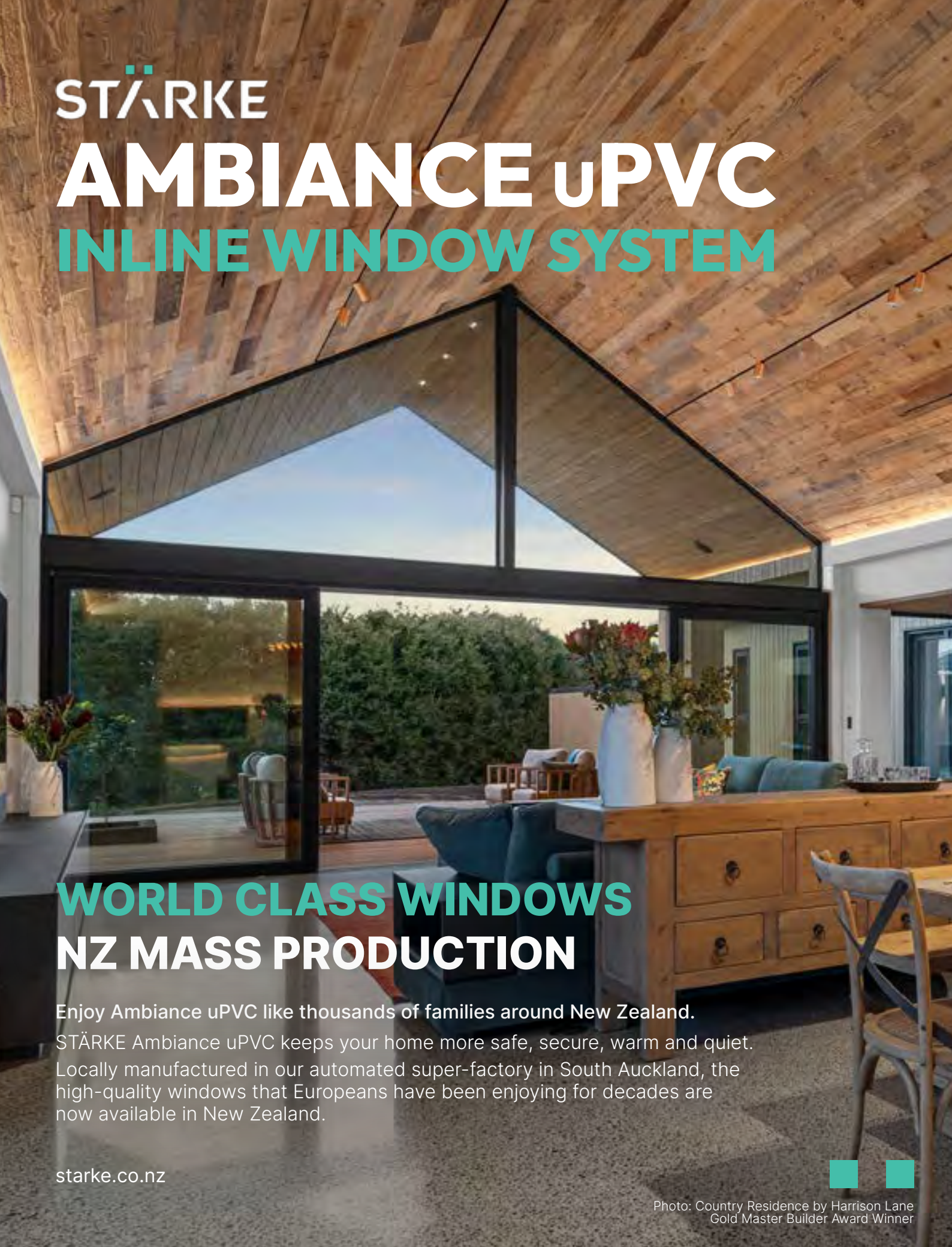

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Photo: Country Residence by Harrison Lane
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HOW TO

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By Steve McNeil, BRANZ Senior Building Physicist

What really is a warm roof?

Warm roofs are becoming popular – not just for commercial buildings but for residential houses too. What's the science behind them and how should they be installed? BRANZ found answers by retrofitting an existing residential house.

Recently, BRANZ retrofitted its ventilation test building with a warm roof – see *Roofing rethink: warm roofs, healthy Kiwis* in *Build* 202. The project sought a practical and straightforward way of retrofitting residential dwellings so they could benefit from the warm roof methodology alongside new-build homes.

Regardless of whether it's a new or retrofitted roof, planning is important. It's necessary to understand what a warm roof is and the different ways of building them to see if the method can be used in your project.

What defines a warm roof?

Most of the answer is in the name. A key thing to note is that warm roofs really mean warm structures because the insulation is located outside of the trusses or rafters, not fitted between them. With this change, the whole dynamic of the roof space changes – see Figure 1 for a comparison of temperatures in a cold and warm roof.

Warm roofs have several benefits over conventional roof constructions. The benefits have been covered in detail in *Build* 161, *Don't be cool about warm roofs* and Build 202, *Roof space moisture – it's complicated.*

BRANZ research puts retrofit warm roofs to the test

In summary, warm roofs include:

- significantly reduced risk of moisture accumulation
- enhanced thermal performance
- reduced overheating risk
- improved efficiency of ventilation systems (inculding heat recovery units) or ducted heat pumps
- less temperature extremes for services such as plumbing
- potentially much longer lifespan for the cladding.

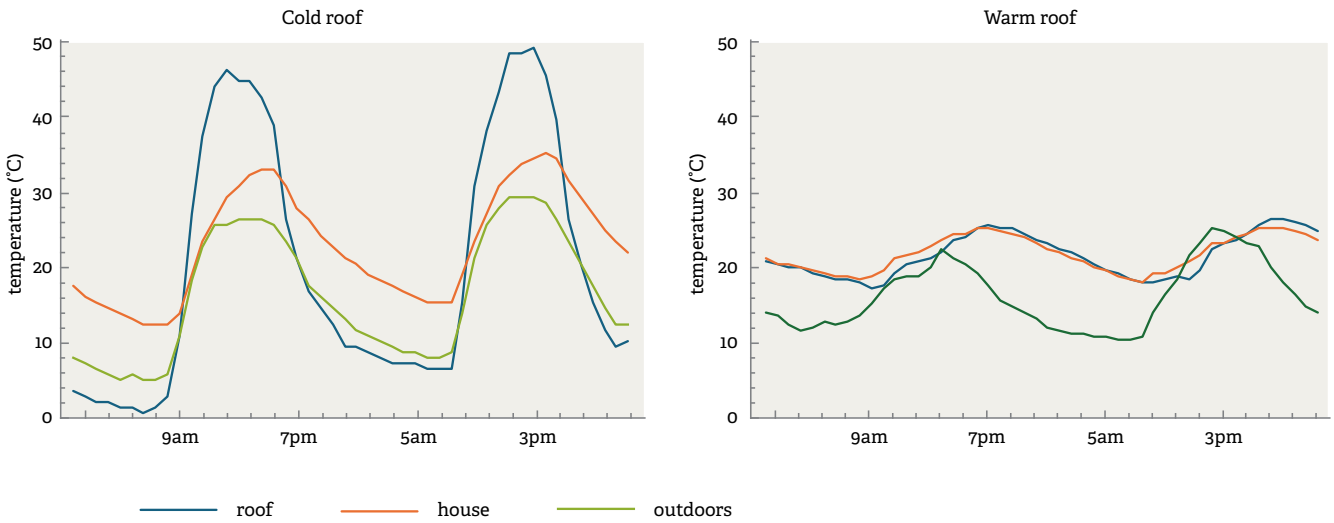

Figure 1: Temperatures in mid-autumn – pre-retrofit cold roof (left) and post-retrofit warm roof (right).

Air and vapour control

It is important that a good air barrier is fitted directly below the insulation layer as the roof space is now entirely within the thermal envelope. There's no need to provide additional passive vents in a warm roof – just treat it the same as the building below. A simple solution would be to incorporate a roof space extract vent into the mechanical ventilation system.

The great thing is that most warm roof systems available here come with good air control as a standard feature. However, make sure the trusses/rafters are blocked at the junction with the top plate and appropriately sealed. It's also a good time to add some additional insulation outside this blocking before closing up the roof. The top of the blocking should be cut to match the roof slope, which will maximise the surface area and make sealing the joint easier.

Vapour control is also something to consider, with a vapour barrier needed for membrane-clad systems to prevent internal moisture collecting under the external membrane and in the insulation itself.

Different options

There are several ways to accomplish warm roof construction and plenty of proprietary systems on the market. These typically fall into three categories:

- Metal-skinned panels – easiest on simple forms and available in long spans.
- Membrane systems – great for low-pitched and large roofs.
- Built assembly with a ventilated conventional roof above (Figure 2) – a good option for retrofits, smaller buildings or those with complicated roof forms.

While hybrid options exist – where some additional insulation is installed either on the ceiling or directly below the bottom deck of a warm roof – they do require specific design and hygrothermal (WUFI) modelling.

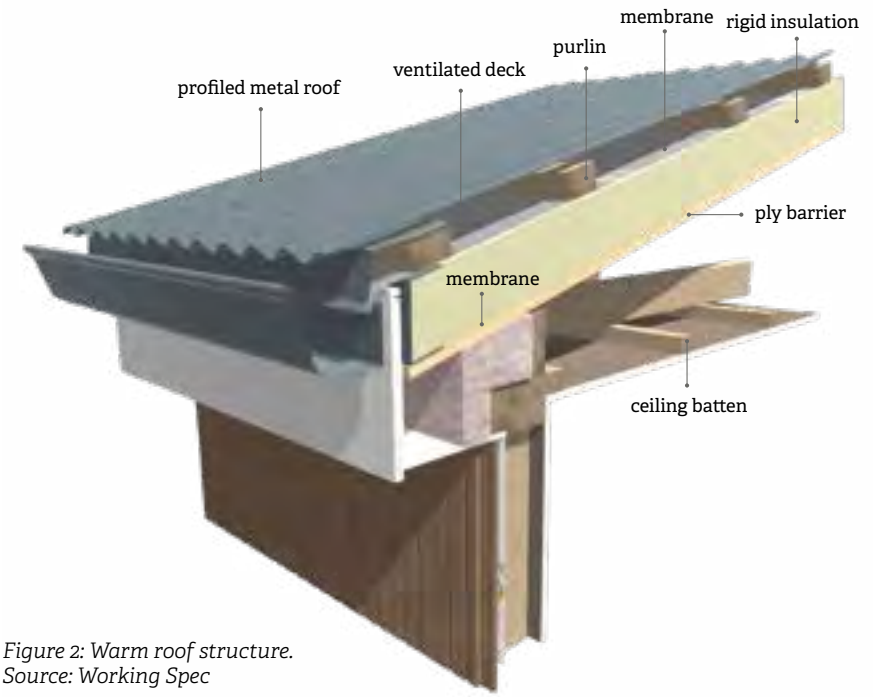

Figure 2: Warm roof structure. Source: Working Spec

The key challenge is that there will usually be discontinuities in vapour permeability and thermal resistance where the materials in the construction change, and poorly chosen combinations can be a significant risk factor for accumulation of internal moisture in the structure.

Hybrid assemblies also pose questions around where the air barrier lies. The skill of the hygrothermal modeller is critical here to ensure any risks are understood and good sensitivity analysis is important. For context with these challenges, there are well-documented failures of hybrid assemblies in the UK, which is why a straight warm roof is the preferred approach.

Each layer has a role

The good thing is that, in a warm roof, the roles of the different layers of the assembly are clear. This removes several of the compromises that exist with traditional construction. There is no longer an expectation that the roof deck has to deal with moisture loads from the inside of the dwelling.

If using a membrane assembly or something like the BRANZ retrofit roof, detail the lower membrane to fall outside the wall cladding. There are a couple of options here. In the case of the BRANZ retrofit, the lower membrane was lapped over the existing fascia and a second fascia was added on a packer to provide a drainage path.

This detail gives the building owners some warning when the roof cladding eventually needs replacing and ensures everything possible is being done to comply with the performance requirement E2.3.5. As the entire sub-roof is effectively an anti-ponding board, it makes sense to use it.

Winter results from the ventilated deck

An obvious question is how the performance of the ventilated deck stacks up compared to traditional cold roofing (which has the same cladding). Measurements in early August 2024 give an idea of how good this assembly is at shedding moisture accumulated due to long-wave overcooling. Figure 3 shows the absolute humidity of the outside air (actual water content per m^3 of air) and the cavity below the roofing on both the north and south faces of the building.

The spikes in air moisture content are the condensate evaporating, with the absolute humidity below the roof deck matching the exterior conditions by 10am on the north side and by around lunchtime on the south side.

The key takeaway is that the lower surface of the roofing stays damp for a much shorter period than traditional roofing in the same circumstances, which should contribute to a longer service life.

What's next?

Summertime data is currently being analysed. Early indications are that there are significant benefits in terms of reducing the risk of overheating. The ventilation building will then undergo a deep retrofit as part of a new BRANZ Levy-funded project: *Framework for reducing the impact of future climate change on building performance.*

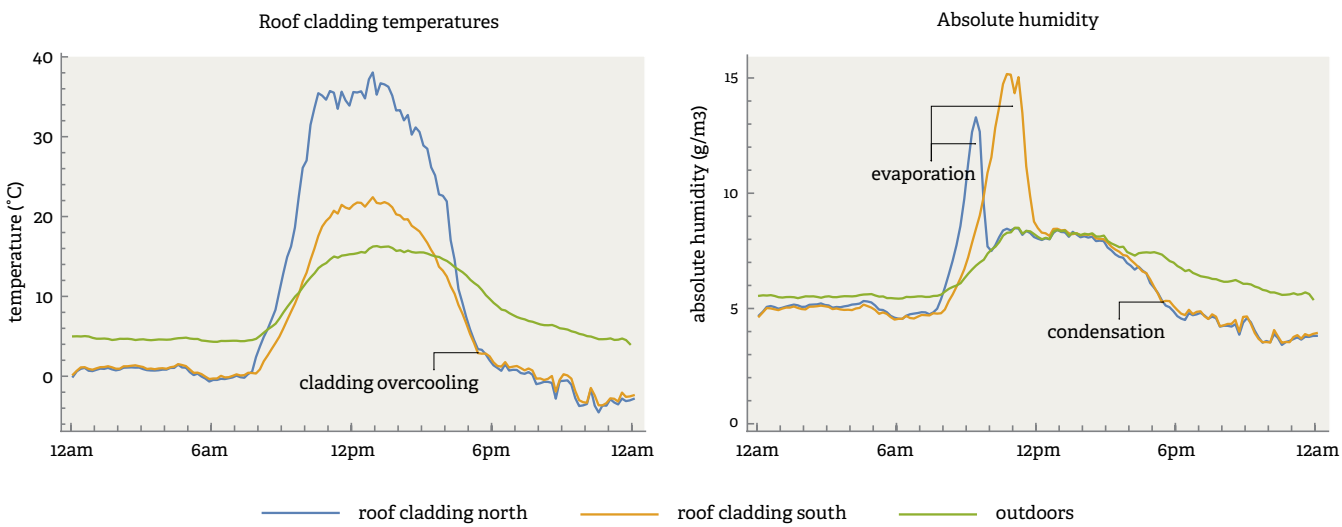

Figure 3: Early August roof cladding temperatures (left) and absolute humidity (right).

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By Greg Burn, Freelance Technical Writer, Structure Limited

Membrane internal roof gutters

Design trends are seeing an increase in the use of internal gutters, previously seen as risky. With advances in their design and construction, they are now a viable option.

At a glance

- Because of design trends, internal gutters are becoming more popular.
- They have been associated with weathertightness failure.
- E2/AS1 is the associated guidance document.
- Building owners must be made aware that internal gutters need regular maintenance.

Internal gutters or gutters within the roof area – sometimes referred to as box gutters – have historically been associated with weathertightness failure, resulting in significant damage to the building interior and the associated inconvenience and cost of repair for the owner. This has resulted in designers avoiding them in their designs.

Due to changing trends in residential design as well as the availability of high-performance, durable membranes, there has been rise in the inclusion of internal membrane gutters in housing – often associated with low-pitch membrane roofs or other low-pitch roofing systems.

Factors for failure

Factors blamed for the failure of internal roof gutters include:

- inadequate design – insufficient capacity, lack of gutter fall, depth/freeboard and the number of drainage outlets and associated drainage overflows
- poor construction and installation
- incorrect material selection
- blockages to the gutter and drainage systems that restrict drainage and create a build-up of water
- lack of maintenance by building owners.

Because of the failure risk of internal gutters, they must be accurately designed and constructed, and building owners must be made aware of the requirement for them to be regularly checked and maintained.

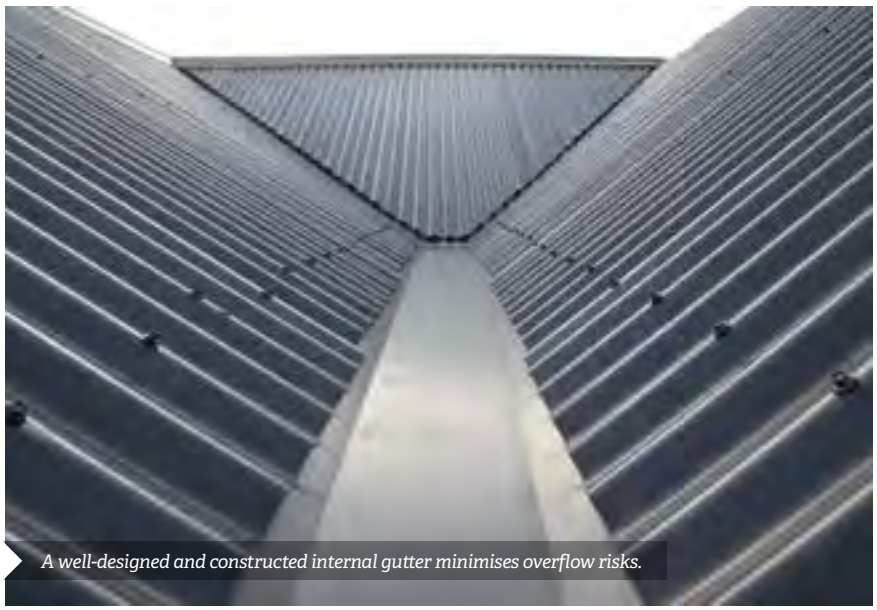
Regardless of the specified roofing material and pitch, membrane internal gutters are a viable roof drainage option and are included in Building Code guidance documents. There is a wide range of suitable membranes available, with most manufacturers and suppliers providing design and installation guidance for both internal roof gutters and associated drainage systems.

Many of the current membranes are pliable and easier to accurately install in more-confined situations often associated with internal gutters. The use of designated membrane installers has also improved the quality of installation.

Refer to E2/AS1

E2/AS1, the guidance document for compliance with Building Code clause E2 *External moisture*, has information on the requirements for internal gutters lined with butyl or EPDM membrane. The use of other membranes suitable for internal gutters is also possible, but these alternatives will require proof of compliance as an Alternative Solution.

E1/AS1 is the guidance document for compliance with clause E1 *Surface water*, covering requirements for membrane internal roof gutters and associated drainage.



A well-designed and constructed internal gutter minimises overflow risks.

Clause B2 *Durability* calls for the membrane to have a specified intended life of not less than 15 years. However, it is sensible to select a membrane that meets the serviceable life of the roof cladding, which could be expected to be greater than this. Selecting a more durable membrane is sensible given that replacement will be relatively difficult in most situations.

Butyl and EPDM membrane internal gutter requirements

While it is non-mandatory to follow Acceptable Solutions as a means of Building Code compliance, both E2/AS1 and E1/AS1 provide good guidance for the design and construction of membrane internal gutters.

E2/AS1 8.1.6.1 sets out specific requirements for membrane internal gutters. They must be constructed with solid substrate gutter boards that facilitate walking on for both construction, membrane installation and ongoing regular maintenance. Construction materials must be compatible with the specified membrane.

The membrane must be installed in one run along the length of the gutter, with no cross-joints in the installation. Butyl or EPDM membrane must be 1.5 mm minimum thickness – 1.0 mm thickness is acceptable for gutters less than 1 m wide.

In no case should the gutter have dimensions of less than a depth of 60 mm minimum and an overall width of 300 mm minimum.

A freeboard depth of 30 mm minimum – over and above the required minimum gutter depth – is required in all situations, with a minimum fall of 1:100 to drainage outlets.

An exception to these requirements is where a membrane internal gutter is incorporated into a membrane roof. In these situations, the minimum gutter depth is 50 mm and there is no requirement for a freeboard allowance.

Where the membrane gutter is installed in roofs formed with non-membrane claddings – for example, profiled metal – the gutter membrane must underflash the roofing material a minimum of 100 mm.

E1/AS1 5.1 sets out specific requirements for the size of internal roof gutters. The internal gutter size needs to be based on dividing the gutter into sections – a section is comprised of the length of gutter between a downpipe or drainage outlet and the high point of the gutter draining to that downpipe/drainage outlet.

Each section of internal gutter needs to have a cross-sectional area not less than that shown in E1/AS1 Figure 16, which provides the area of gutter based on the plan area and pitch of the roof discharging into the section of gutter. The cross-sectional area required is based on a rainfall intensity (I) of 100 mm/hr. Many areas of Aotearoa have a rainfall intensity greater than this – these are shown in E1/AS1 Table A.

Where the intensity for the gutter design under consideration is greater than 100 mm/hr, the required gutter size needs to be calculated by taking the value from Table A and multiplying it by the ratio of I/100.

Internal gutters must drain to downpipes – often via a scupper into a rainwater head or an internal drainage outlet. E1/AS1 Table 5 provides the minimum internal size for round and rectangular downpipes for a given roof pitch and roof plan area served by the downpipe.

All membrane internal gutters require overflow outlets. E1/AS1 5.5.1 calls for overflow outlets that drain to the exterior of the building, with the top of the outlet set at least 50 mm below the top of the gutter. The cross-sectional area of the overflow shall be the same size or greater than the size of the downpipes serving that section of internal gutter.

Drainage outlets and overflows for internal gutters in membrane roofs shall be formed as shown in E2/AS1 Figures 63 and 64.

Membrane internal gutters serving other roofs – for example, profiled metal – must discharge into a rainwater head (which incorporates an overflow) as shown in E2/AS1 Figure 63(a) and (b). Alternatively, they can discharge to an internal outlet as shown in E2/AS1 Figure 64(b) or (c), with overflows provided by another outlet to a rainwater head or an overflow as shown in Figure 63(c) positioned at a height that will not allow water to overflow into the building from the gutter.

Membrane internal gutters design and construction

When an internal gutter incorporated into a long-run metal or tile roof fails or overflows, it is likely that water will enter the building's roof assembly and ultimately the interior. While this is less likely with a membrane gutter that is integral with a roofing membrane, it is still a possibility. Therefore, accurate design and construction is fundamental for effective internal gutter performance.

Key considerations for membrane internal gutter design:

- Design internal gutters that are sufficient to capture and dispose the maximum rainfall intensity that the roof catchment will be exposed to, regarding width, depth and freeboard.
- Eliminate any changes of direction where possible – run the gutter in one straight length. Changes in direction can create construction challenges and restrict water flow.
- Ensure the gutter has effective fall.
- Have sufficient outlets – in the case of one outlet being blocked, another can discharge the full potential catchment.
- Incorporate effective overflow outlets that are located so that overflow water is visible to building occupants (alerting them to potential issues with the gutter).
- Specify a gutter membrane that is fit for purpose.
- Size the gutter to allow easy access for maintenance.
- Ensure the gutter is constructed to eliminate potential in-service deflection or structural movement.

What to consider

To ensure internal membrane gutters collect and drain water as effectively as possible, it is better to be more conservative with design and construction:

- Design to a rainfall intensity of not less than 200 mm/hr.
- Ensure the gutter has sufficient freeboard capacity to prevent overflowing due to wave action occurring in windy situations. This can occur when the water level in the gutter is above 50 mm below the top of the gutter.
- Take the sides of the gutter well above the height of the drainage outlet or overflow. If the outlet/overflow is blocked – not just through lack of maintenance but due to hail or snow – water could overflow into the roof space with non-membrane roofs.
- Construct the gutter wider than the 300 mm minimum required – this will not only increase flow capacity but also allow for easier viewing and access for maintenance. It can also facilitate easier repair where required.
- Increase the number of drainage outlets beyond requirements.
- Incorporate snow guards in snow-prone locations – snow accumulation will block water flow.
- Ensure downpipes and/or spreaders from above do not discharge directly into an internal gutter.
- Incorporate drainage outlets at no more than 12 m centres – this will provide a maximum gutter run of no more than 6 m.
- Incorporate dome-type leaf guards to internal drainage outlets.
- Increase the gutter fall beyond the required 1:100 minimum. A 1:60 fall will provide better drainage, ensuring all water is removed more effectively, and will allow for any potential inaccuracy in construction or deflection in the gutter over time, meaning that drainage will not be compromised.
- Locate overflow outlets where overflow will be easily visible.
- Ensure the gutter construction is solid enough to eliminate deflection/sagging over the life of the building.

Maintenance is crucial

Once the internal membrane gutter installation is complete, it should be flood tested to ensure that it drains effectively and that there are no leaks. Any internal downpipes associated with the gutter must also be pressure tested prior to enclosure.

As internal gutters have a higher risk of failure because of lack of maintenance, building owners need to be made aware of the need for regular inspections of both the gutter and drainage systems and the removal of any accumulated debris. Inspection for any potential degradation of the membrane is also important.

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By Griffin Cherrill, BRANZ Research Scientist

Comfort over compliance – designing to maximise outcomes

Only by looking at a building as a whole can optimum performance be achieved, and that means looking beyond compliance.

At a glance

- Buildings work as a system and only by looking at the performance as a whole can we ensure good outcomes.
- Schedule and calculation methods focus on thermal resistance only, so a house that complies with H1/AS1 may have issues with overheating if solar heat gains are not controlled.
- Verification Method H1/VM1 considers other factors such as heat gain and occupant loads. It gives a more reliable understanding of how the building will potentially perform.
- H1/VM1 is still linked to a reference building, which does create some challenges in getting the best from a design.
- Prioritising occupant comfort using computer modelling means compliance with H1 is achieved as part of the process rather than being an afterthought tacked on at the end.

Buildings work as a system. Changing just one aspect – like insulation – can disrupt the balance. Minimum R-value updates in New Zealand Building Code clause H1 in 2023 help reduce heat conduction, keeping the warmth inside in winter and the heat outside in summer. However, a lack of solar control can cause excessive heat gains and lead to overheating. Year-round comfort and energy efficiency can only be achieved when all components, like insulation, ventilation and solar control, are considered alongside each other. To truly deliver comfort and efficiency, we need to look beyond compliance and design for performance.

H1 compliance methods

The Building Code sets out the minimum performance of a residential house. The

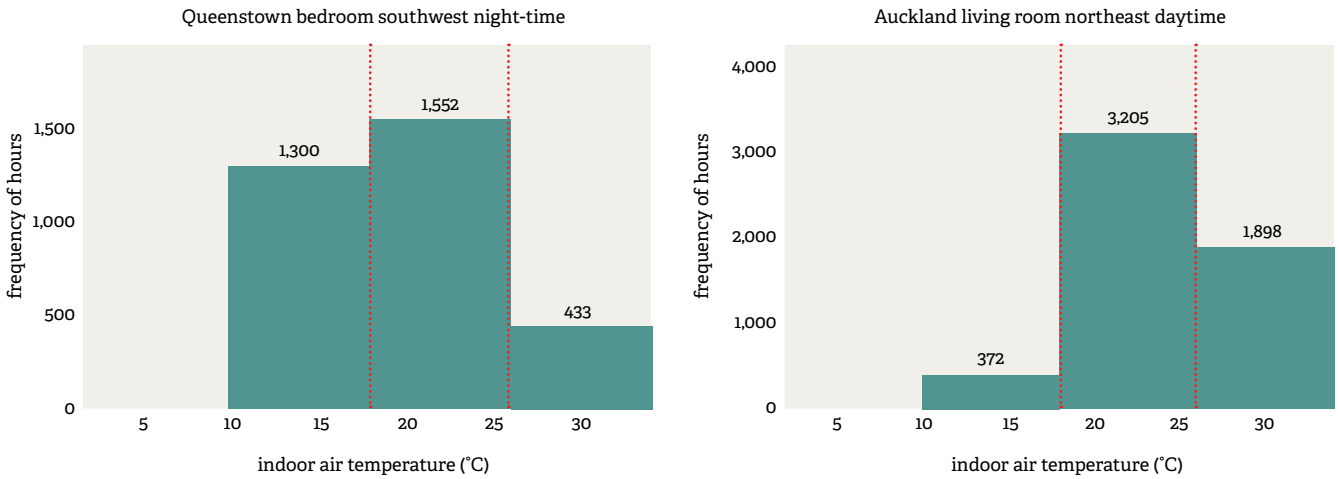

Figure 1: Using the schedule method – overnight (10pm–7am) temperature distribution for Queenstown bedroom (left) and daytime (7am–10pm) temperature distribution for Auckland living room (right).

pathways to achieve the performance are set out in the clauses. In clause H1 *Energy efficiency*, compliance can be demonstrated through one of two Acceptable Solutions or a Verification Method.

Acceptable Solutions are designed to be accessible and cost-effective in all situations. In New Zealand's heating-dominated climate, they work on the basis that increasing insulation reduces heat loss, which leads to warmer indoor temperatures. The schedule method specifies the minimum insulation R-values in each building element based on the location. The calculation method compares the heat transfer coefficient of the proposed building to that of a reference building.

The reference building has the same form, areas and orientation but is calculated with the minimum R-values from the schedule method and up to 30% glazing. These methods don't account for solar heat gains due to radiation through glazing, meaning a house that complies with either Acceptable Solution may experience overheating and have high cooling costs.

On the other hand, H1/VM1 uses computer simulation to calculate the heating and cooling loads considering all variables in a building, including solar heat gains. Much like the calculation method, H1/VM1 achieves compliance when the

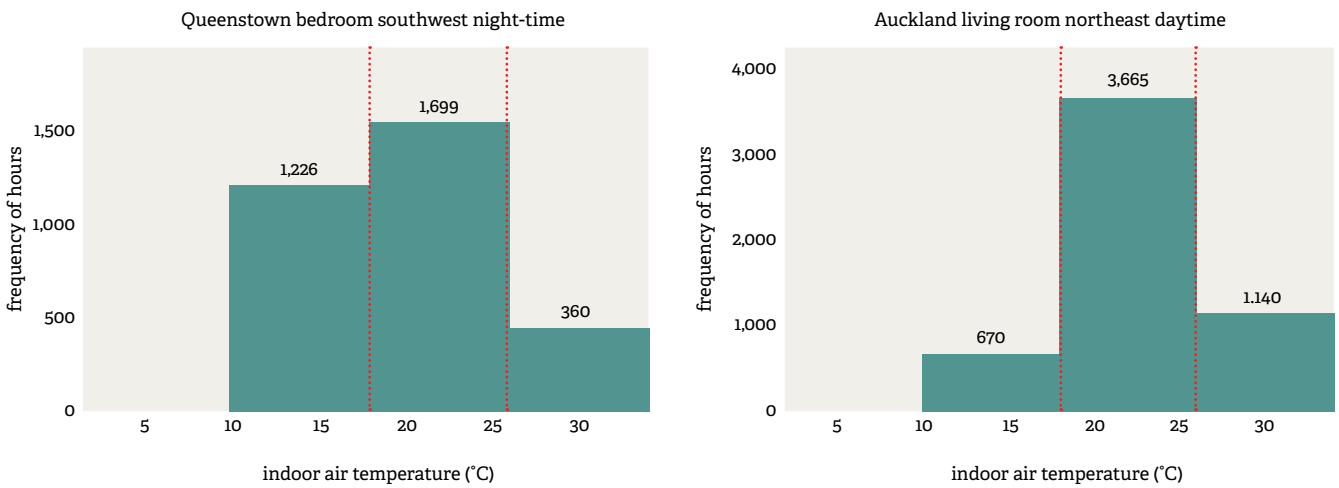

Figure 2: Using H1/VM1 – overnight (10pm–7am) temperature distribution for Queenstown bedroom (left) and daytime (7am–10pm) temperature distribution for Auckland living room (right).

proposed building performance exceeds the reference building – but in terms of energy demand rather than heat transfer.

Focusing on occupant outcomes

Along with energy demand, H1/VM1 tools can calculate the internal conditions, allowing occupant comfort to be a design factor. While not specifically a requirement of H1/VM1, once a building is modelled, designers can go beyond compliance to assess the risk of underheating and overheating and mitigate potential moisture accumulation issues. This sort of efficient design can reduce both installation and running costs while also demonstrating compliance with clauses E3 and G4.

The idea of designing to maximise occupant outcomes is explored here in the climates of Queenstown and Auckland. These models follow the methodology from H1/VM1, including the standardised assumptions about occupancy and plug loads/schedules and infiltration. Instead of conditioning the buildings, the models are free running, meaning they have no ventilation or space conditioning.

Minimum R-values from H1/AS1 are used in the schedule method building, which becomes the reference building. The calculation method building has lower R-values, while the H1/VM1 building uses a combination of insulation, glazing and shading to optimise performance.

In Queenstown's colder climate, the schedule method demands higher R-values in the floor and windows to reduce heat loss. Conversely, the warmer climate in Auckland means lower minimum R-values and a greater risk of overheating, which is not mentioned in the clause.

Results

The air temperature from three zones in the house was calculated. Figures 1 and 2 show the frequency of hours that fall within the specified temperature range, where 18–26˚C is considered comfortable. Graphs compare the overnight hours (10pm to 7am) in a Queenstown bedroom and daytime hours (7am to 10pm) in an Auckland living room using the schedule method and H1/VM1.

In Queenstown, the need for heating in the schedule method building is high, with around 35–40% of the occupied hours below the 18˚C minimum. In Auckland, the problem lies in overheating, with 30–35% of the occupied hours greater than 26˚C. However, results show the houses also have issues with uncomfortable hours on the other end of the spectrum.

Using a reference building with 30% glazing, the calculation method allows for the R-values of building components to be lower than the schedule method. In Queenstown, this increases the problem of underheating. However, in Auckland, it appears to have a positive impact as it reduces the overheating hours. Although this sounds ideal, the number of comfortable hours remains largely unchanged.

Using the Verification Method, the houses in Queenstown and Auckland are optimised with ideal insulation levels, solar shading and low-E glazing. The impact on the number of underheating and overheating hours differs throughout the rooms. However, the result consistently shows an increase in the number of comfortable hours.

In some cases – for example, in the Auckland living room – the underheating hours increase when using the Verification Method. However, the significant decrease to the overheating hours and improvement to the total number of comfortable hours makes up for this.

With an optimised design, there is a reduced reliance on both heating and cooling systems as the house can passively maintain comfortable conditions, meaning compliance is demonstrated. However, this shows that better outcomes cannot be achieved without considering the building as a system, specifically the solar heat gains.

In summary

Acceptable Solutions limit the heat transfer between inside and outside using insulation, with the assumption that higher R-value insulation leads to warmer temperatures indoors. However, ignoring solar heat gains can lead to overheating.

H1/VM1 requires the modeller to not only limit the heating energy but also cooling energy. It asks the modeller to assess the building as a whole and implement strategies other than just insulation to reduce energy use. Once the building has been modelled in a simulation, there is an opportunity to take the design further by assessing occupant comfort.

Rather than relying on standardised Acceptable Solutions, H1/VM1 enables a reliable assessment to optimise the design. This could lead to a building with less insulation than the schedule method minimum but with strategically placed external shading and a low-E coating on the glazing.

On the other hand, the building fabric and glazing placement could be optimised to deliver a better-performing building at the same cost. Using computer modelling allows the designer to understand how certain decisions can affect performance and occupant comfort. By prioritising occupant comfort, it delivers better outcomes and naturally achieves compliance.

Only by considering the house as a system can the optimum balance between solar radiation heat gain and opaque conduction heat loss be identified. Insulation alone cannot solve all the issues – it needs to be considered alongside building orientation, glazing and ventilation. These interconnected factors need to be considered together to optimise comfort and reduce energy demand.

Ideally, future updates to H1/VM1 should move towards an absolute performance goal rather than the reference building. An absolute rather than relative target sets a clear and measurable goal that promotes innovation and ensures all homes meet a consistent standard of efficiency and comfort.

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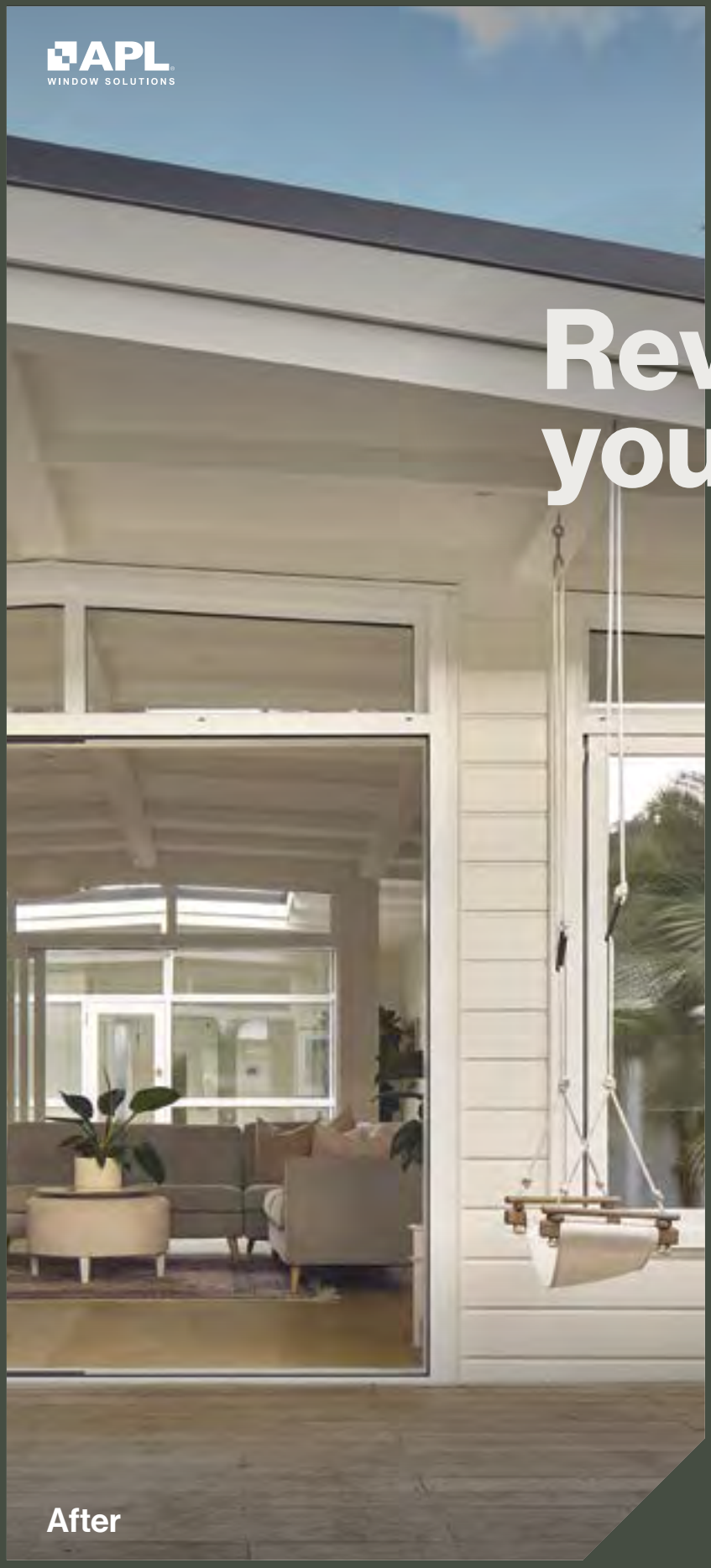

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HIGH PERFORMANCE BUILDING SOLUTIONS

By Greg Burn, Freelance Technical Writer, Structure Limited

How to submit a good consent application

Missing documentation and poorly executed drawings are two of the main reasons a consent application may be returned with a request for information (RFI). Levy-funded research found there's room for consistency and clear guidance on building consent drawings to improve them and lift the understanding of those reading them – thereby streamlining the consenting process.

A key task for a building designer, after agreeing on a design with a client, is to transform that design into a set of construction documents that facilitate the accurate construction of the building.

The documents also form the basis of a building consent application. Obtaining a consent will allow construction to proceed.

What's the problem?

Importantly, the documents need to be understood and followed by all those involved in the building process, including the client, the building consent authority (BCA) officials who process the consent application and review the construction, builders and associated subtrades doing the pricing and carrying out construction, material suppliers … the list goes on!

The vexed issue of requests for information in *Build* 205 looked at the behaviours of those preparing building consent applications and the BCA staff processing them and discussed some associated problems.

It noted that the BRANZ external research report *ModelDocs: Transforming building consenting behaviour for better housing* found a significant difference between what designers believe is sufficient documentation for a consent application and what BCAs require to process the application. This means there's a high number of RFIs issued following consent applications, creating delays in the process and causing frustration all round.

Complex designs

The ModelDocs report also showed that some of the documentation issues may relate to the complexity of buildings being submitted for consent.

Most consents lodged are for R1–R3 type residential buildings (as defined by MBIE's national BCA competency assessment system levels). The difference in complexity

between an R1 building and an R3 building is significant, with a corresponding difference in the documentation required. The complexity levels of C1–C3 non-residential buildings are different again and require another level of documentation.

Look to MBIE for guidance

A surprising finding of the report is that the industry may not be fully aware of the guidance currently available on building consent documentation requirements – yet MBIE's Building Performance team provides plenty.

For example, *How to support your building consent application* provides guidance on a range of supporting documentation – from Acceptable Solutions and Verification Methods to producer statements and design features reports. The guidance also includes a standard order of documents checklist for building consent applications with information about building plans (drawings) and supporting documents such as geotechnical reports and H1 *Energy efficiency* calculations. The guidance clearly identifies what plans are required and what they should include.

Guidance on the building consent process is also available. *Understanding the building consent process* covers everything from RFIs to start and end dates.

Then there's the Co-ordinated Building Information (CBI) system – a classification system for the construction industry covering the five main information sources associated with construction: drawings, specifications, quantities, technical and research information, and trade information and publications. This is also a useful aid to preparing consent documentation.

Further, all BCAs provide building consent lodgement checklists. While these vary in detail, they cover all the information needed to process a consent, clearly define the sequence of documents and provide clear guidance on drawings that need to be included with each aspect of a project. They also differentiate between requirements for residential and commercial buildings.

Regardless of what documentation is submitted for consent, the main area of conjecture often relates to the relevancy and quality of that documentation, particularly the drawings.

No professional guidance on preparing drawings

What appears to be missing is specific guidance for those preparing consent drawings from the professional bodies that represent them. Designers produce most of the documentation but lack supporting information from their representative bodies.

Building officials often encounter drawings that not only lack adequate detail but are also difficult to follow and comprehend. While commercial pressures or budgetary constraints are often given as reasons for these deficiencies, ModelDocs also identified a frequent lack of knowledge about what's required by the BCA and the compliance requirements of some Building Code clauses.

ModelDocs also found varying ability among building officials to understand drawings, so there's a need for drawings to be prepared in a way they can be read and understood by all involved in the consent and building process.

On the other hand, it's often noted by building officials and builders that sets of drawings contain too much information – adding to the processing time and creating confusion.

Drawings in a digital format or at a smaller scale are often given as reasons for rejection. Small-scale drawings often lack sufficient identification or explanation of critical aspects of construction.

Relevancy is another concern. Often drawings don't accurately relate to a building because they have been cut and pasted or use inappropriate details from a common library. Designers need to be more diligent about selecting details that relate specifically to the design.

There is also often a disconnection between the drawings required to construct the building and those required to get the consent. Some designers are said to prepare construction drawings suitable for builders and subtrades to price and construct the building and then add the minimum extra information that will allow the building consent to be processed.

Examples of typologies should be available

There's an opportunity to provide clear guidance on what's required for building consent drawings. Improving the content and quality of drawings should not only streamline the consenting process but also improve the understanding of all those needing to read and interpret them.

An openly available exemplar of acceptable consent and construction drawings, across a range of typical building technologies, would be useful for designers and should be relatively easy to compile.

Similarly, more consistency among BCAs on the required components of consent documentation such as a standard building consent lodgement checklist would improve the quality of that documentation.

Also required is a focus on consent documentation in continuing professional development across all industry professions.

With the potential for AI to be used for building consent processing soon, consistency and conformity of documentation across the industry will become even more critical.

FOR MORE

See MBIE Building Performance *Understanding the building consent process*

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FEATURE SECTION

Data

Big data, AI and advanced analytics are shaping smarter decision making and transforming the building and construction sector.

IN THIS SECTION

Building by numbers

Data that's up-to-date, verified, connected and easy to interpret fuels better decision making, which drives better outcomes for stakeholders. That simple principle lies behind Build Insights, a new online tool developed by BRANZ that tracks key trends and health signals in our building and construction sector.

BY COLIN BARKUS, PRINCIPAL WRITER

Locating, accessing and making sense of data from across Aotearoa New Zealand's complex building and construction sector has long been notoriously difficult. Planners, policy makers, regulators, developers, financers, product manufacturers and homebuyers looking for evidence to support critical decisions often faced a minefield of fragmented information – some of it current and reliable, much of it not.

'Our sector partners told us how hard it was trying to identify emerging opportunities and challenges in the building system, track the impact of changes and understand how different parts of the system interact with each other,' says Matthew Curtis, a senior economist at BRANZ.

'There was a clear call for data and other research outcomes to be packaged in a way that enables different audiences to easily find, digest and use the information they need.'

BRANZ recognised it was uniquely positioned to heed that call. In 2019, it began an ambitious project working with multiple sector stakeholders to understand what data was being produced and by whom, how the data was being stored and used, how it overlapped and interacted, what was missing and how it might be packaged to present a more meaningful overview of the state of the sector.

The end result – Build Insights – was launched by BRANZ in May this year. Build Insights is a free online tool that helps stakeholders 'connect the dots' and recognise the trends, possibilities and potential challenges emerging in the sector.

Build Insights helps connect the dots on trends in the sector.

Single source of truth

Build Insights brings together data and analysis from government and private sector organisations across the country, including Ministry of Housing and Urban Development, Stats NZ, Ministry of Education, Ministry of Business, Innovation and Employment, CoreLogic, Land Information New Zealand, Pacifecon, Ministry for the Environment, Real Estate Institute of New Zealand, EBOSS, Electricity Authority and University of Auckland.

Census, consenting and house price data is included, while BRANZ data – collected over many years using world-class scientific practices and facilities – underpins about 50% of the tool's insights.

'Each dataset paints its own picture, but brought together, they form a clearer and wider view of our current building system,' says Matthew.

'Build Insights creates a trusted single source of truth, offering nationwide insights, statistics, research findings and historical indices. We've developed it to support best practice and decision making across the industry.'

Among the insights the tool provides are:

- housing demand
- forecast pipeline of construction work
- land availability and section prices
- consenting timeframes
- builder and trade performance
- workforce trends
- housing conditions and energy consumption.

How it works

Build Insights presents information in dashboard style. Insights are organised into seven key domains accessed via tabs on the dashboard.

Demand includes information on:

- changes in rent
- changes in house price affordability
- population growth by region relative to growth in available housing
- forecasted dwelling unit consents
- the pipeline of work in construction.

Plan includes information on:

- availability of land for housing
- median section prices
- changes in the number of resource consents processed.

Design includes information on:

- time spent in BCA consenting, including time when 'the clock is stopped'
- input by homeowners into new house designs
- industry sentiment about demand.

Build includes information on:

- client satisfaction
- tradesperson call-backs
- build timeframes.

Operate includes information on:

- alteration and addition consents
- house condition and levels of maintenance
- energy consumption
- water usage.

System impact includes information on:

- waste in demolition and construction and other environmental impacts
- construction industry profitability
- construction industry productivity
- total income per employee.

System resilience includes information on:

- ratios for residential construction businesses
- return on equity for residential construction
- industry spend on research and development
- percentage of projects using BIM
- difficulty in recruiting new staff
- participation in construction training and tertiary education
- construction businesses starting and ceasing operations by year.

Under each domain, information is presented as a series of at-a-glance statistics and interactive graphs.

The ability to compare data between the seven domains is planned for a future version of the tool.

Who it's for

Build Insights serves a broad range of stakeholder needs.

Industry professionals

Build Insights provides information on construction pipelines and regional demand to help forecast and estimate projects and workload. Planning is supported by insights on land availability and consenting timeframes and approvals. Data on workforce trends, resilience of building companies, customer satisfaction and defects in workmanship is also available.

Government

Government officials can use Build Insights data to inform policy and ensure ministers have accurate, relevant and current information to support decisions. Local authorities can use the data to understand regional differences and identify key issues affecting their jurisdictions.

Researchers

Build Insights collates data from reliable sources – enabling researchers to gauge the need for new study projects, build support for research and funding applications and assess long-term environmental and social-impact trends in the sector.

Homeowners

Build Insights allows homeowners to research the most attractive places to live based on a range of factors such as house prices, land availability and the construction pipeline (showing where housing is due to be built). Homeowners can assess how long it is likely to take to build or remodel a home based on factors such as supply chain and consenting timeframes.

Continued development

'For the first time, different players in the sector have access to data and analysis that's connected, consistent and trustworthy that they can use to support a wide range of important decisions,' says Matthew.

'BRANZ will continue to develop Build Insights by adding data sources and new ways of rendering and comparing information to make sure it meets the evolving needs of the sector.'

FOR MORE

Visit Build Insights

Build Insights – a foundation for solutions

Insight

175,000 new houses could be **needed in Aotearoa New Zealand** by 2030.

Insight

It costs on average **over $200,000 more** to **build a new house** than to buy an existing one.

Potential solutions

- **Designing for new ways of living** such as multi-generational or multi-family homes.
- **Changing perceptions** around simpler, smaller, lower-cost homes.
- **Promoting whole-of-life cost savings** in new builds.
- **Working with the finance sector** to understand the long-term value of new builds.

Build Insights is your go-to online tool for trusted data and sector-wide trends in building and construction.

Spot emerging challenges, uncover new opportunities, and make smarter planning decisions

The data covers all this and more:

- Housing demand
- Construction forecast pipeline
- Land availability and section prices
- Consenting timeframes
- Housing conditions and energy use across the country

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What is the role of big data in construction?

This article explores the challenges and opportunities of leveraging big data to understand the sector's capacity and capability.

BY CASIMIR MACGREGOR, BRANZ PRINCIPAL BEHAVIOURAL SCIENTIST

The construction sector plays a vital role in the economy, but its ability to plan effectively is often constrained by fragmented, inconsistent data. Big data has the potential to improve construction planning, risk management and operational efficiency. Access to accurate and timely information – whether from historical or upcoming projects – is essential for construction professionals and project owners alike.

Much of the big data used in construction is high level – it identifies and classifies projects, offering a broad overview. Yet construction is a complex system with numerous interdependencies, which makes drawing meaningful insights challenging.

Big data refers to vast and continually growing digital datasets and the analytical tools used to interpret them. Big data has been defined by three main attributes:

- Volume – massive amounts of data (terabytes or petabytes).
- Variety – diverse formats such as text, numerical, sensor data, audio and video.
- Velocity – real-time, constantly streaming data.

Some researchers add value (usefulness) and veracity (trustworthiness) as additional dimensions. In construction, data is typically large, diverse and ever changing. It can inform project planning, track company financials, monitor progress and optimise operations.

Big data's role in construction has grown significantly. It offers new possibilities, particularly in forward planning for workforce capability and sector capacity. However, big data can only offer useful insight if the subject is well understood.

In August 2023, a workshop was held during CanConstructNZ, an MBIE Endeavour-funded project led by Massey University aimed at creating capacity and capability for the New Zealand construction sector. This event brought together key government and construction stakeholders to identify major data challenges and collaboratively design solutions for improving access to pipeline and sector data. Participants highlighted three key areas of interest:

- Construction pipeline – understanding current and future projects, especially overlaps or niche typologies (for example, community housing or high-skill projects).
- Sector performance – monitoring how the industry responds to demand, including internal workforce migration and quality metrics.
- Construction economics – analysing costs, including price indices, land costs and benchmarking data.

Together, these themes aim to clarify what the sector is doing and how insight from data such as aligning workforce capability with pipeline demand can improve delivery.

A consensus emerged in the workshop – construction companies across Aotearoa New Zealand face similar data-related challenges:

- Data quality and consistency – many sources are disjointed, outdated or insufficiently detailed. What level of detail is needed? What qualifies as data that is good enough?
- Data access – high-quality data often resides in the private sector and may be commercially sensitive.
- Data silos – there is no central repository for construction data.

Another issue was differing organisational and company priorities. One participant noted, 'The needs of organisations are different, so they only capture what they need. If we use [the data] for another purpose, it might not fit.' This raises the issue of fit for purpose – but for whom? The end user? The analyst?

Conceptualising big data insights for complex construction systems

To make sense of big data in such a complex environment, a structured framework is needed:

- **Define system boundaries:** Identify key subsystems (project types, supply chains, labour, safety, scheduling) and how they interact. Mapping these relationships helps highlight dependencies and feedback loops that affect capacity and performance.
- **Identify data inputs, sources and quality:** Start with a minimum dataset to track projects. Additional data may be needed to capture interdependencies – historical performance, productivity metrics, environmental conditions and more. However, this data must be cleaned to remove errors and inconsistencies, which are common in construction environments. A data quality matrix can help assess external sources for validity.
- **Choose analytical methods based on need:** Big data insights depend on the right analysis. There are three key approaches:
  - » Descriptive analytics – summarise what has happened such as trends in costs, delays and incidents.
  - » Predictive analytics – use machine learning to forecast outcomes such as completion times or supply chain issues.
  - » Prescriptive analytics – leverage AI or simulations to recommend actions such as optimal scheduling and cost reductions.
- **Apply systems dynamics modelling:** It is crutial to understanding cause-and-effect relationships. For example, how do supply chain disruptions affect construction timelines? Modelling these dynamics and including feedback loops can simulate how one change affects the broader system. Scenario testing helps prepare for different conditions, improving scheduling and resource optimisation.
- **Communicate insights effectively:** Turning technical insights into actionable strategies is essential. Risk assessments, performance tracking (planned vs actual) and project interdependence should all be communicated clearly. Consider the audience – project managers may prefer dashboards, while executives might need high-level summaries. Tailor formats to ensure insights drive decisions.
- **Embed feedback in decision making:** Insights must be fed back into future planning and operations. Embedding data use into the wider organisational culture such as consistent project management practice can improve how analytics are used across the business. A culture that embraces data can help shift construction from reactive to proactive decision making guided by real-time, predictive insights.

Using big data has the potential to transform the construction sector. However, this requires a cultural shift towards data-driven decision making and collaboration across the industry. If implemented effectively, big data insights can help the construction sector move from reactive to proactive management, driving long-term improvements in efficiency, productivity and resilience.

While big data alone will not solve all the challenges facing the construction sector, a well-structured, systems-based approach to data collection and analysis can provide the insights needed to support informed decision making.

Progress towards AI-assisted consenting

The building consent process is famously onerous. Could AI be harnessed to help streamline the work? A BRANZ research project aims to find out.

BY ORIN LOCKYER, BRANZ SOCIAL SCIENTIST, STEPHEN MCNEIL, BRANZ SENIOR BUILDING PHYSICIST, AND AIDAN BENNETT-REILLY, BRANZ RESEARCH SCIENTIST

In the next few years, the New Zealand construction sector will see increased adoption of new technologies – from further growth in the use of building information modelling to digital product specification information and the adoption of other quality assurance tools. The building consent system is one area likely to see high impact from digital technology, especially as the consenting environment is becoming increasingly complex and more reliant on processing large amounts of data.

Recently, the potential of artificial intelligence (AI) to enhance digital consent systems has been recognised. AI could assist with processing by automating parts of the consent process that currently require vast amounts of documentation to be checked manually.

Addressing the pain points

BRANZ has commissioned research to identify where AI could be used by building control officers (BCOs) within the current building consent system to create efficiencies. The research will ask BCOs across the country about the pain points they experience in processing building consent applications and how they think AI could eliminate them.

To date, the research suggests that many of these pain points are caused by missing documentation (including producer statements, manufacturer warranties and CodeMark certifications) or inaccurate information that triggers a request for information (RFI). BCOs envision three main ways that AI could potentially help.

Pre-submission checks

Most building control authorities (BCAs) have some sort of vetting process or pre-submission check that occurs before an individual building consent application is lodged with the council. Currently, these checks verify whether the right documentation is included with the application but not whether the information within that documentation is complete and accurate.

As one BCO said, the completeness check misses some of the more technical details that only get picked up when they're in the hands of a qualified BCO. 'We have a vetting process upfront, which is looking at the completeness of applications as such, but that's only like a completeness check that hasn't really captured everything that we're looking for, which can be quite a technical process as well.'

BCOs are interested in using AI to improve their vetting processes by verifying completeness and accuracy, ensuring all necessary documentation and basic information are included before formal submission. BCOs are interested to know if AI could pick up missing information such as:

- drawing scale
- index/content sheet
- certificate of title
- north direction
- site plan
- floor plans
- existing elevations
- relevant boundaries
- underground services
- construction details.

Understanding specifications and supporting evidence

BCOs are often overwhelmed by the amount of information provided to them as

part of the consent process. They wanted to know if some form of AI chatbot or search engine could help them find information as quickly as possible – for example, whether an AI tool could easily search and determine things like:

- whether the lintel size complies with NZS 3604:2011 *Timber-framed buildings*
- whether the retaining wall design meets the relevant standard
- whether any given material can be in contact with another as per E2/AS1 Table 21
- the required flashing dimensions upon confirming the wind zone
- the stud height.

Written communication between applicants and responders

A significant part of a BCO's role is communicating effectively with those who have submitted building consent applications in order to get good-quality information back through the RFI process. Communication is typically initiated when applications require more documentation before the consent can be approved.

BCOs are interested in whether AI could help them craft a good-quality RFI letter. One participant said, 'That's a challenge in itself … how do you communicate a reasonably technical thing in a way that can get you the answer that you need?'

BCOs want to know whether AI could improve the quality and consistency of communication during the RFI process by improving grammar, providing references to supporting material, automatically simplifying language and referring to specific Building Code clauses. This would help applicants understand why the BCO is asking for particular information in an RFI.

Next steps

BCOs see great potential in the use of AI to assist them with their work and alleviate some of their more time-consuming jobs. In the coming months, the BRANZ research team intends to continue talking with BCOs and collect as many potential AI use-cases as possible. After that, the research team plans to speak with consent applicants to get their perspectives on the consent process and potential applications of AI. The final stage of the project will be to test which of these potential use-cases might be feasible to trial and implement.

If you would like to be part of the conversation – either as a BCO or a professional who submits building consent applications – contact Orin Lockyer at orin.lockyer@branz.co.nz.

Climate resilience with advanced data analytics

Collecting and analysing historical and real-time data is valuable in predicting climate resilience, enabling project stakeholders to make the right decisions.

BY XICHEN CHEN, SCHOOL OF FUTURE ENVIRONMENTS, FELIX B TAN, FACULTY OF DESIGN AND CREATIVE TECHNOLOGIES, AND DAT TIEN DOAN, ALI GHAFFARIANHOSEINI AND AMIRHOSEIN GHAFFARIANHOSEINI, SCHOOL OF FUTURE ENVIRONMENTS, AUT

From floods and fires to storms and droughts, more frequent and severe climate events are challenging the resilience and adaptability of our built environment. These disasters also place greater pressure on infrastructure to perform under changing conditions. The question is no longer if we should respond but how we can respond smarter.

Digital technologies – especially those that capture, analyse and draw insights from large volumes of data – are becoming increasingly essential to enable climate resilience. They support a more dynamic, data-driven approach to decision making across the asset life cycle – one that is not just reactive but also predictive, preventive and adaptive.

Digital technologies as catalysts

Climate-resilient construction goes beyond meeting compliance requirements – it's more about proactively preparing for, responding to and recovering from climate-related disruptions. As climate risks become more frequent and complex, digital technologies offer a practical pathway to resilience – one built on data, enabled by technology and guided by smart insights.

Different technologies play different roles in this process. Internet of Things (IoT) sensors and cloud platforms help collect and store vast amounts of data. Data wrangling and big data support the cleaning and processing of that data, while artificial intelligence (AI), machine learning and business intelligence platforms analyse patterns and turn insights into smarter, more targeted decisions.

By analysing past events, monitoring current conditions, simulating future scenarios and identifying vulnerabilities, these tools support three key types of analytics that underpin climate resilience:

- Predictive analytics use historical and real-time data to forecast risks and assess their likely impacts on buildings and infrastructure.
- Preventive analytics detect early warning signs and guide timely interventions to reduce the chance of failure and avoid costly damage.
- Adaptive analytics enable systems and structures to adjust over time, responding flexibly to new and evolving climate conditions.

Landscape of data in construction – historical and real-time

A key part of building climate resilience is understanding the environment in which the project operates – and that starts with data. Today's construction projects generate more data than ever before, much of which is directly relevant to managing climate-related risks. Such data generally falls into two categories – historical data and real-time data:

- Historical data includes past weather and climate records (rainfall intensity, flood frequency, extreme temperatures), energy use, material wear and tear and failure or maintenance reports from buildings and infrastructure. These datasets help establish baseline risk levels, identify long-term trends and support decisions on what, where and how to build more resiliently.
- Real-time data is gathered through IoT sensors that measure temperature, humidity, structural stress and ground movement; smart tracking devices that monitor site activity and workforce conditions; and drones and satellite imagery that capture live images of site and environmental conditions. This live data provides up-to-date visibility into site conditions and structural behaviour under changing circumstances.

Bringing together both types of data creates a fuller, more dynamic view of climate risks and how systems perform over time. Digital technologies make this possible by collecting, integrating and presenting data from multiple sources to enable more localised, accurate and context-aware decisions.

Today's construction projects generate more data than ever before, much of which is directly relevant to managing climate-related risks.

Advanced technologies such as building information modelling (BIM), AI-powered analytics platforms and digital twins enable stakeholders to make decisions that are not only reactive but also predictive (such as predicting landslide risks from rainfall data), preventive (such as modifying material selection to suit projected temperature shifts) and adaptive (such as optimising construction sequences in response to changing ground conditions).

Role of analytics in smarter decision making

Data alone doesn't build resilience – it's the insights that lead to action that make the difference. That's where analytics comes in. By applying algorithms, models and visual tools, data analytics technologies help project teams make sense of complex information and act on it.

Here's a real-world example of preventive analytics in action. Along a 25 km stretch of the North Island Main Trunk line, WSP New Zealand and KiwiRail have installed a real-time geotechnical monitoring system to improve climate resilience on slip-prone rail infrastructure. The system collects and analyses data from cameras, rain gauges and slope and debris sensors to monitor ground conditions in real time. It sends alerts and high-frequency imaging when thresholds are crossed, usually during severe weather, enabling KiwiRail to respond quickly and avoid delays, derailments and expensive damage.

In this case, digital technologies work together to:

- collect data from sensors and external sources
- store and process the data through cloud-based platforms
- analyse patterns and identify early warning signs of potential environmental hazards
- trigger action through real-time alerts and dashboards.

This seamless flow from data to insight then to timely response demonstrates how data-enabled preventive analytics reduce infrastructure vulnerability to climate-induced disasters.

Beyond individual events, analytics also support long-term planning activities such as climate risk assessments, asset prioritisation and carbon emissions tracking. These insights can be integrated into digital twins or BIM models to test different design options and understand how design choices affect long-term resilience.

In all these cases, analytics bridge the gap between information and action. It helps engineering and construction teams to:

- prioritise climate risks based on likelihood and impact
- optimise designs and construction methods for future conditions
- reduce life cycle costs by preventing failures and enabling quicker recovery.

Enabling systemic change

More projects are now trialling digital technologies to improve climate resilience, but the real opportunity lies in scaling these solutions across projects. This shift isn't just about adopting new tools – it also requires changes in how organisations, policies and systems work together.

Across Aotearoa, we're seeing encouraging progress. For example, Auckland's Safeswim platform uses real-time data to forecast water quality at city beaches, while Wellington's digital twin helps communities visualise flooding and sea-level rise scenarios.

These city-wide digital twins are complemented by national platforms such as NIWA DataHub, which provides real-time climate information. Together, they demonstrate how digital technologies turn data into knowledge, then insights into timely actions. Governments, agencies and industry leaders increasingly expect infrastructure investments to demonstrate long-term resilience.

Shared digital platforms

Of course, challenges remain. Many organisations still face limited access to reliable data, a lack of shared standards and gaps in digital capability. But data intelligence is strengthening collaboration across the board. With shared digital platforms and scalable analytical capacities, engineers, architects, planners and policy makers can access the same information, exchange insights and coordinate their actions.

This breaks down silos and supports faster, more informed decisions. Importantly, these technologies are now becoming more accessible across firms with varying business sizes. New Zealand's Digital Boost initiative offers free online resources and training to help small and mid-sized firms benefit from data-driven insights through cloud-based tools and user-friendly interfaces without the need for dedicated in-house data teams.

A data cornerstone for a low-carbon built environment

New Zealand's National Embodied Carbon Data Repository will support the industry to make more informed, environmentally responsible decisions when selecting materials and designing buildings.

BY MIKE JACKSON, GENERAL MANAGER – CONSTRUCTION SPECIFICATION, CIL-MASTERSPEC, REGISTERED ARCHITECT

In 2016, BRANZ introduced Aotearoa New Zealand's first freely available life cycle assessment tool, LCAQuick, which included a database showing the environmental impacts of construction products. While ground-breaking, the initial release included only limited products and third-party data licensing prevented open visibility. A more accessible yet narrower dataset, CO_2NSTRUCT, followed, focusing only on product manufacturing impacts.

Over the years, both tools were incrementally expanded. However, infrequent updates meant delays in integrating new data, which reduced their relevance amid rapidly evolving construction practices.

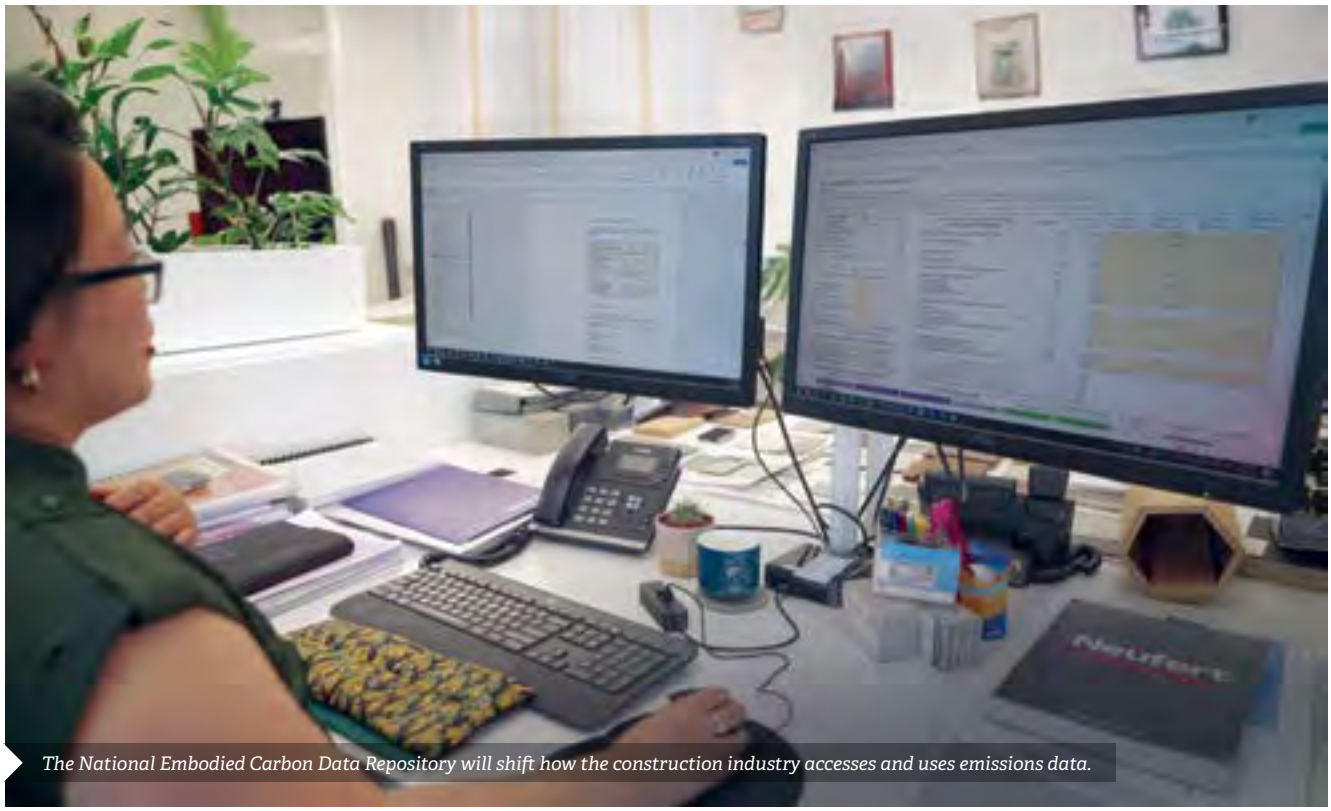
Major step forward in 2025

The launch of the National Embodied Carbon Data Repository later this year will fundamentally shift how the construction industry accesses and uses emissions data. This centralised, industry-led online resource will provide reliable information on the carbon emissions associated with construction materials and products. Its goal is to help the sector make more informed, environmentally responsible decisions when selecting building materials and designing buildings.

Former BRANZ principal scientist Dr David Dowdell, who led the development of the original dataset and serves as an advisor on the National Embodied Carbon Data Repository project, says it's inspiring to see BRANZ's original research being adopted by the industry for the industry.

'This milestone enhances transparency and accessibility of embodied carbon data and offers a vital resource to help the sector reduce emissions from Aotearoa New Zealand's built environment.'

Designed for enhanced usability, transparency and consistency, the repository will uphold the principles of open access and scientific integrity. The data will be ▸▸



The National Embodied Carbon Data Repository will shift how the construction industry accesses and uses emissions data.

regularly updated and freely available as open data. The initiative is the result of a partnership between BRANZ and Construction Information Limited (CIL), which trades as Masterspec and which is owned by the construction industry, while the New Zealand Institute of Architects and Registered Master Builders are backing the project as shareholders.

In December 2024, the government released its second emissions reduction plan, outlining national targets for the 2026–2030 period. The plan reaffirms the country's commitment to achieving net-zero carbon emissions by 2050.

Key to the plan is the need for consistent, standardised reference data to support informed decision making across the sector. The CIL/BRANZ initiative directly addresses this need and is formally endorsed by the Ministry of Business, Innovation and Employment (MBIE) and supported by the New Zealand Government.

Key features

- An online platform that allows easy review of data and lets third-party software platforms and calculation tools connect and interact with it.
- Complete visibility of a product's impact on climate change throughout its entire life, supported by physical characteristics, scenario assumptions and verified information.
- Data preference matrix scoring – a framework for assessing data quality, which enables users to evaluate data reliability and may support carbon assessments at the building or project level.
- Live updates that happen as soon as new LCA documentation is available, making them much faster than they are now.
- New Zealand-relevant data – for example, transport data from the Ministry for the Environment clearly visible and open to review. Local data will continue to be a distinguishing feature of the BRANZ dataset.
- Recognition of innovative life-cycle practices such as verified take-back schemes that reduce embodied emissions or enhance circularity.
- End-of-life carbon methodology – a new approach aligned with MBIE's guidelines will separate emissions from

carbon kept or passed on when products are reused or recycled, showing the difference between released and stored carbon.
- Governance and stewardship – resources will be dedicated to overseeing the repository with the aim of continuous improvement in validating new information and assessing ongoing integrity.
- Authoritative and well maintained based on the principle of freely available data and backed by the rigorous and robust early BRANZ research. This is crucial for the repository's success.

Impacts and opportunities

There are impacts and opportunities for many in the wider construction industry while accelerating the decarbonisation of the built environment.

For policy makers and regulators

Data from this new national and standardised repository can:
- be incorporated into building performance frameworks such as consenting, green rating systems and public procurement requirements
- support legislation, guidance or incentives that encourage manufacturers to submit verified environmental data and participate in circular practices.

> **"It's inspiring to see BRANZ's original research being adopted by the industry for the industry."**
> *– Dr David Dowdell*

For product manufacturers and suppliers

Manufacturers and suppliers will:
- be able to differentiate their products by providing carbon performance data and highlight any improvements through an authoritative and nationally consistent method.
- need to submit environmental product declarations (EPDs) and other life cycle assessment studies that meet qualifying criteria, which are being tested and are subject to change (see box).

For architects, engineers, and designers

They will be able to:
- embed data into early design decisions and models to reduce whole-of-life carbon impacts
- use the data preference matrix scores to inform product and material selection and support evidence-based sustainability claims in client reporting and certifications
- compare products with confidence and make more informed, sustainability-driven selections.

For data providers, researchers and third-party software developers

The repository presents opportunities to:
- develop tools, such as calculators and building models, that reference a consistent, free and nationally available dataset
- utilise the API to consume high-quality, peer-reviewed data and collaborate with CIL and BRANZ to refine default assumptions as part of an on-going continuous improvement process
- advocate for transparency to build trust in the system.

Looking ahead

The New Zealand National Embodied Carbon Data Repository represents a critical infrastructure investment to support climate-resilient construction. Its emphasis on open access, rapid updates, innovation recognition and local relevance ensures it will play a pivotal role in shaping a built environment fit for the future.

By working together across sectors, we can use this tool to make meaningful progress toward a low-carbon, circular and sustainable construction industry in Aotearoa.

Draft qualifying criteria for EPDs and other life-cycle assessment information

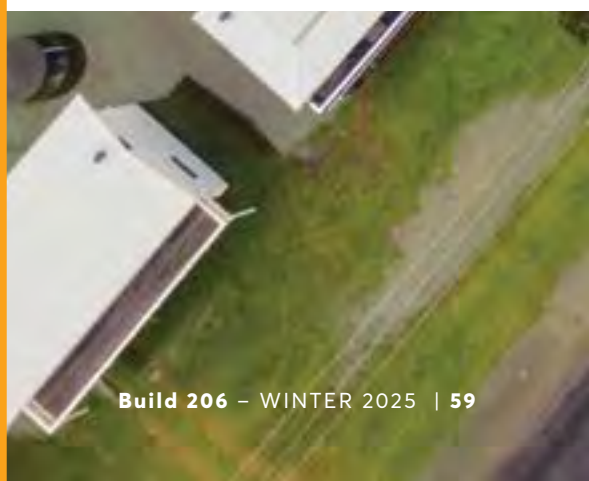
- Data to be free and publicly available, without the need to request.
- Manufacturing emissions scope to be up to the boundary with module A4.
- Data relevant to New Zealand.
- Data to have undergone a certified independent third-party review that has found it to be compliant with a named relevant standard. The review should additionally include in-scope relevant named subsidiary standards/ PCRs and (for EPDs) the most recent GPI. The third-party review should comply with ISO 14025.
- Reported emissions not to include offsetting.

FEATURE SECTION

Resilience

As safe as houses ... or so the saying goes. How do we build resilient houses and bounce back better after an event? We share new advice, changes to LIMs and the benefits of relocating homes.

IN THIS SECTION



Built to withstand

Earthquakes, floods, landslides, windstorms, coastal erosion and coastal inundation – Aotearoa New Zealand's recent history is punctuated by extreme natural events that pose significant risks to our buildings and the lives and livelihoods of their occupants.

This three-part feature looks at the key resources available to help designers, builders and their clients assess the risks, reduce those risks through resilient design and recover efficiently and safely should disaster strike.

BY COLIN BARKUS, PRINCIPAL WRITER

To build or not to build

In some places, the risks posed by natural hazards might be so significant that building simply isn't recommended. How do designers, builders and their clients decide?

It might be a dream clifftop home with fabulous sea views, a first family home in suburbia or an apartment block, office building or public facility in town – extreme natural events can put any building in virtually any part of the country at risk. Before any new project starts, those risks need to be understood – and sometimes a difficult call needs to be made.

Fortunately, reliable information is freely available to help designers, builders and their clients decide whether proceeding with a building project is wise.

CRESA and BRANZ risk assessment resources

With support from the public good science fund administered by the Ministry of Business, Innovation and Employment (MBIE) and the Building Research Levy, the Centre for Research Evaluation and Social Assessment (CRESA) has prepared *Selecting a Site for Your Home* – a simple, practical tool for assessing the risks posed to any building site by natural hazards (access using the QR code over the page). Much of the advice provided in CRESA's tool is also summarised in BRANZ bulletin BU700 *Natural hazard information for building sites*, available this July.

Start with the council

The BRANZ bulletin and CRESA tool recommend obtaining a land information memorandum (LIM) report from the local council as a starting point. From 1 July 2025, councils are required to include information known to them about natural hazards affecting land and the impacts of climate change that exacerbate natural hazards (see *Disclosure of natural hazards in LIM reports* on page 66).

BRANZ also recommends obtaining a copy of the record of title for the site from Land Information New Zealand. The record of title will show what type of title applies to the site, which determines how the owner can act in certain situations – including after a natural disaster. The record of title might also include a notice (added under section 72 of the Building Act) about existing natural hazards, which could affect the owner's ability to obtain insurance or a mortgage for the site. It's well worth investigating before deciding whether to purchase or build.

CRESA's tool suggests several additional questions to ask the council to aid the decision-making process:

- Did the development require a resource consent or Resource Management Act hearing?
- Has the site flooded more than once in the past?
- Has the site been affected by slips and debris flows in the past?
- Is the infrastructure in the area more than 25 years old?

Several councils offer free online hazard maps or viewers that allow users to enter a specific address and see any natural hazards to which the location is prone.

Note that, as well as providing this kind of information, councils can apply mandatory requirements to new buildings in identified hazard zones such as higher floor levels in flood-prone or low-lying areas. A consent for construction of a building can also be denied altogether based on the risks posed to the land or other nearby property by natural hazards. It's advisable to ask about such requirements and restrictions early in the planning process.

Ask the developer

CRESA also recommends asking the developer, vendor or real estate agent some key questions before proceeding with a project:

- Have risk assessments of the site been undertaken?
- Have mitigation works been required in the development?
- Has insurance on property or contents in the area ever been refused or been subject to higher premiums because of natural hazard risk?

Do your own research

Another useful source of information is the local library or museum. These facilities usually hold a comprehensive record of any past floods, storms or other severe natural events affecting the area and their impacts on the community such as prolonged supply disruptions to electricity, water or other utilities.

It's also well worth consulting insurance companies directly about the scale and nature of natural hazard risks in the area and how they affect insurance cover and premiums.

The Natural Hazards Portal, maintained by the Natural Hazards Commission Toka Tū Ake (NHC), includes a searchable map showing insurance claims for natural events such as earthquakes, landslides and storms settled by NHC (previously EQC) since 1997. Users can enter an address or click on an individual property to see if there are settled EQCover or NHCover claims on it. While a property showing a settled claim is not necessarily a bad thing, looking up an address will reveal any history of claims and help inform about potential risks.

Finally, CRESA and BRANZ suggest having a good look around the site and ▸▸

its immediate surroundings. How close are streams, rivers and other waterways and what is the likelihood that a flood will affect the site? Are there trees sculpted by strong winds or large or broken trees nearby that might present a risk to the property in the future? Is there evidence of landslides and debris flows nearby? If it's a coastal property, how far is it from the high tide line?

Regional and national sources

There's also a wealth of regional and national information available from organisations such as GNS Science and NIWA. Free online resources show active fault lines, tsunami risk, climate norms and expected climate extremes. NIWA's climate change projections show how the risk of flooding, coastal inundation and other weather-related hazards is likely to change in future in different parts of the country.

BRANZ Maps is another useful resource showing earthquake risk, climate and corrosion zones and expected rainfall intensities for specific addresses anywhere in the country.

Check with an expert

In some cases, particularly if the site has already been directly affected by a natural event, it's worth commissioning a risk report from specialists.

If there may be geotechnical issues with a property – for example, if it's on a steep slope or there's evidence of landslides in the area – request a geotechnical report from a chartered professional engineer. The council may also require this as part of a consent application.

FOR MORE

View CRESA *Selecting a Site for Your Home*

Visit the Natural Hazards Portal

View BRANZ Maps

Natural hazards put properties at risk.

Designing and building for resilience

Once the decision to proceed with a building project is made, reliable, research-backed resources are available that offer advice on reducing a building's vulnerability to extreme natural events.

This July, BRANZ will publish another bulletin – BU701 *Building on land subject to flooding and/or landslides* – that's essential reading for anyone building on a site known to be at risk of flooding or landslides.

The bulletin summarises the key considerations, regulatory frameworks and requirements that relate to designing and building for resilience against these hazards. It looks at how the Building Act, Building Code, NZS 3604:2011 *Timber-framed buildings*, Resource Management Act, district plans and other local requirements govern what resilience measures may or may not be taken.

Broad approaches and detailed design tips

The new bulletin also offers practical ideas for building resilience into all aspects of design. It covers broad principles – such as options for locating a building on a flood-prone site – as well as ways that flood-resilient design can be introduced to the individual components and features that make up the building and property.

At the broad scale, the bulletin advises identifying and then building away from natural drainage paths or channels on the site and locating the building on the highest part of the property whenever practicable. Existing vegetation should be retained where possible too – especially mature trees, which can play a significant role in stormwater management.

At the component level, flood-resilient design involves making use of materials, construction systems and house styles that can withstand substantial and multiple floods. Flood-resilient design allows homeowners to remove and store belongings before a flood and then clean up and repair after floodwaters recede with less disruption.

The bulletin offers some specific ideas:

- Design a piled rather than a flat concrete slab foundation to create a higher floor level and allow a home to be relocated more easily if needed.
- Install utilities such as water heating cylinders on a raised platform rather than on the floor.
- Specify flooring materials with high resilience such as compressed fibre-cement, hardwood floorboards or plywood rather than particleboard or strand fibre products.
- Specify flood-resilient skirtings and solid doors rather than hollowcore doors.
- If there are staircases, make the bottom riser of stairs removable for easy cleaning and drying out.
- Use flood-resilient cabinetry in kitchens and bathrooms.
- For homes on sloping ground, try to avoid sealed driveways directing surface water towards the house.
- Specify permeable paving for driveways and paths.
- Ensure that paved and unpaved surfaces within 2 m of a home direct stormwater away from the home.

The bulletin also lists multiple sources of additional information.

CRESA tool: storms, floods and heavy weather

A wealth of practical advice and checklists are also offered in a tool produced by CRESA with support from BRANZ – *Resilient Homes: Storms, Floods and Heavy Weather* (access using the QR code over the page).

The tool notes that a resilient house features simple design, materials and systems. It highlights how the siting of a house matters too. For example, a house oriented to catch the sun can make a big difference if electricity is cut during a storm and there's no alternative energy source for heating and lighting.

Included are useful rating scales that enable designers, builders or buyers to assess resilience component by component as they design a new building or review an existing property.

What the tool covers:

- Roofs – the complexity of roof design and the condition of guttering and downpipes significantly affects resilience in heavy weather.
- Skylights – these can be a weak link during storms and other high wind events. They can be broken by debris and vulnerable to wind-driven rain.
- Canopies, verandas, decks, porches, lean-tos and additions – add-ons like these can be a problem if they are weakly connected to the main dwelling, poorly detailed or poorly maintained. They can be damaged in high winds because they alter the air pressure around the house.
- Windows and glass doors – glass components can be broken by windblown debris or wind pressure.
- Walls and wall claddings – simple is best. A house with multiple junctions and lots of different claddings requires more maintenance and can be harder to repair if damaged in a storm.
- Exterior doors – like windows, doors tend to be weaker than walls so can be vulnerable to windblown debris and can fail at much lower wind pressures than walls.
- Wiring and electrical systems – these can be very vulnerable to water. Resilient ▸▸

houses have plugs and switches set at least a metre above the floor and avoid running wiring under the floor.
- Heating, cooking, lighting and water – a house that's not always dependent on reticulated water and electricity will be more resilient.

CRESA has developed another helpful tool that rates the resilience of different styles of typical building components such as flooring, insulation, wall claddings and doors (access using the QR code below).

Building above Code

Another new online portal, Design.Resilience.NZ, is a one-stop shop of resources for those who want to design buildings that go above the structural requirements of the Code. Most of the resources relate to building for resilience against earthquakes and include, for example, guidelines for designing seismic isolation systems, advice on hollowcore floors and BRANZ's code of practice for seismic performance of non-structural elements.

A new framework for building performance will protect property as well as people.

The portal is an authoritative source of recognised non-regulatory design and construction documents and a valuable source of information for designers and practitioners. It is a joint undertaking between NHC, MBIE, BRANZ, New Zealand Geotechnical Society, New Zealand Society for Earthquake Engineering and Structural Engineering Society of New Zealand.

Shifting the seismic focus

Aotearoa's current seismic design standards focus mainly on saving lives. However, recent earthquakes have highlighted the need to update those standards so they also protect property and reduce economic impacts after a seismic event.

New research led by BRANZ is working towards revising the seismic loading standard and developing a new framework for building performance that aims to protect property as well as people.

That same principle underpins a new resource recently launched by NHC in collaboration with MBIE. The *Low Damage Seismic Design* resource will eventually comprise three volumes of technical advice on designing buildings that perform better in an earthquake, ensuring the buildings can continue to be used after the shaking stops.

The aim is to support building owners, developers and design teams who want building designs that:
- lower the potential risk of earthquake damage to a new building
- reduce the time it takes before a building can be used after an earthquake
- provide sustainability benefits such as fewer repairs and reduced likelihood that a building needs to be demolished after a major earthquake.

Volume 1 of the resource was released earlier this year and sets the scene by explaining concepts and terms, outlining the value of the approach, advising on how to start and explaining the limitations of seismic performance of buildings designed to the New Zealand Building Code. Volumes 2 and 3 are expected to be released later this year.

FOR MORE

View CRESA *Resilient Homes: Storms, Floods and Heavy Weather*

View CRESA Building Component Resilience Rating Tool

Visit Design.Resilience.NZ

Download *Low Damage Seismic Design* Volume 1

Building back

Two additional BRANZ bulletins provide critical advice for builders and their clients dealing with the complex and often traumatic aftermath of a home damaged by flooding or other extreme natural event. How can the building be returned to usable condition quickly, efficiently and safely?

Following Cyclone Gabrielle and the Auckland Anniversary floods in 2023, BRANZ Bulletin BU666 *Restoring a home after flood damage* (access using the QR code below) proved invaluable for thousands of households facing a major clean-up and repairs. The bulletin provides comprehensive step-by-step guidance on what to consider and how to proceed after a home has been flooded.

Safety first

First and foremost, the bulletin stresses the importance of ensuring the safety of anyone accessing and working at the site.

Access must be avoided altogether until Civil Defence Emergency Management personnel have assessed whether the building is safe to enter. The bulletin clearly explains the system of coloured placards (red, yellow and white 'stickers') and what they mean for owners and others wishing to enter damaged buildings.

The dangers posed by a flooded property aren't always obvious. The bulletin explains that, beyond any clearly apparent physical dangers, there's the risk of additional flooding or land slippage and the possibility of hazards inside like exposed electrical wires, leaking gas and contaminated items.

No cutting corners on drying out

Once safe entry is secured, thorough drying out is the priority before any remedial work begins. Often the temptation is to crack on with major repairs but thorough drying out will prevent longer-term damage and ongoing problems from mould or timber decay.

Proper drying out is a complex process and could take months – particularly in winter. The bulletin lists comprehensive steps to take to ensure no nook or cranny that could be harbouring moisture is forgotten – including within plasterboard and insulation, behind skirting boards and under baths and shower trays.

There's special advice for cleaning inside – including basements and subfloor spaces, which might require the use of pumps or drainage channels. There are also tips for cleaning up outside. For example, the bulletin explains how to clean brick and blockwork properly and describes the special attention that must be given to monolithic cladding.

The bulletin also acknowledges that opportunity can often follow adversity. When older homes are damaged by flooding, there might be an opportunity to build back smarter – for example, by applying a brush-on preservative to structural framing timber so it meets the latest Building Code requirements.

There's also a list of things to check before beginning redecoration.

Laws, regulations and special powers

A third soon-to-be-released BRANZ bulletin – BU702 *Construction work after an emergency* – complements the other resilience-themed bulletins with a summary of the various laws and regulations that govern what and how construction work can proceed after a natural disaster.

The bulletin looks at the extraordinary laws and powers that can be enacted after an emergency and how they affect building owners and building practitioners commissioned to undertake repairs. It also includes information about urgent works that might be required to prevent injury or death and works that might be exempt from requiring a building consent in the wake of a natural disaster.

Also discussed are the dos and don'ts of dealing with insurance companies following an emergency. It might seem like a low priority at the time, but keeping a full and accurate record of the condition of the property and all actions taken is key.

FOR MORE

Download BRANZ Bulletin BU666 *Restoring a home after flood damage*

Disclosure of natural hazards in LIM reports

From 1 July 2025, people planning to build a new home and the building industry at large have access to better information around the natural hazards applying to building sites. Owners of land affected by natural hazards now have less power to block the disclosure of information that councils hold.

BY DAVID HINDLEY, FREELANCE TECHNICAL WRITER

Under a significant amendment to the Local Government and Official Information and Meetings Act 1987, a council must include in a land information memorandum (LIM) report understandable information known to it about natural hazards in relation to land and the impacts of climate change that exacerbate natural hazards.

The law change protects councils who make the information available in good faith, removing liability in civil or criminal proceedings brought by disgruntled owners of affected properties. The law also requires regional councils to pass on what they know about natural hazards to city and district councils.

Coastal erosion is a common natural hazard around Aotearoa.

LIM reports

A LIM report from a city or district council is usually prepared at the request of a potential buyer of a property. It is part of due diligence around the purchase. LIM reports have typically included

information such as rates valuations (including overdue rates), zoning details, building and resource consents for the property, stormwater and sewerage drains, land features and so on.

Information about natural hazards such as potential erosion, slippage or flooding has sometimes been included, but there have been many cases where the owners of land subject to hazards have fought councils to stop these details being recorded against their properties. There have been instances in recent years where councils have backed down in the face of legal threats and the information has not been included in LIM reports. How different councils provided natural hazard information in LIMs has also varied greatly. The law change addresses these issues.

Guidance on implementing the changes

Regulations have been prepared to help councils implement the changes – for city and district councils sharing natural hazard information in a LIM and for regional councils sharing natural hazard information with city and district councils.

Guidance includes:

- how natural hazard information is summarised and presented such as requirements for headings and plain-language summaries
- specific information to make natural hazard information understandable such as requiring councils to include hazard maps in the district plan.

The regulations make it clear that LIM reports are just information disclosure tools and that councils are not required to provide property-specific risk assessments or other further analysis for a LIM. Anyone purchasing a LIM report is still expected to undertake their own risk assessments.

The regulations set out broad headings that councils must use to help achieve nationwide consistency. Councils must include either known maps of natural hazards affecting a property or provide a link to an online natural hazard mapping portal with the known maps of natural hazards affecting a property.

What defines a natural hazard?

There are different definitions of natural hazards in different legislation such as the Building Act, the Natural Hazards Insurance Act and the Resource Management Act (RMA). The amended Local Government and Official Information and Meetings Act uses the definition in section 2(1) of the RMA: 'natural hazard means any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment'. That's quite broad.

Other sources of information

In addition to LIM reports, there are other sources of information on the natural hazards that apply to a property, including council maps and the record of title.

Council maps, typically accessible online, show the level of risk from hazards such as liquefaction, flooding, landslide, erosion and coastal hazards. Because producing these maps is expensive, larger urban councils typically have more maps or more detailed maps than smaller councils.

The record of title for a property can show further information:

- When a building consent is issued subject to section 72 of the Building Act. This note on a record of title identifies the natural hazard(s) that apply to the property. A section 72 note means that the building consent authority is exempted from liability for damage arising from the natural hazard (Building Act section 392), the Natural Hazards Commission Toka Tū Ake (NHC) can fully or partly decline claims depending on the hazard (Natural Hazards Insurance Act section 77) and insurance companies may decline cover or may exclude cover for the relevant hazard.
- Whether NHC has cancelled building cover or land cover for a property or limited its liability for future damage. It can do this under the Natural Hazards Insurance Act, for example, when a homeowner has not begun making repairs to a substantially damaged property within a reasonable timeframe.

A record of title can be obtained from Toitū Te Whenua Land Information New Zealand.

Relocating houses

Over a third of the houses removed following damage in the 2023 Auckland floods have been relocated. Relocation is preferred over deconstruction or demolition as it reduces waste going to landfill and provides a home for a new household.

BY DAVID HINDLEY, FREELANCE TECHNICAL WRITER

Aotearoa New Zealand's housing stock is generally well constructed to handle relocation. 'Wooden-framed houses are great candidates for moving,' says David Carradine, a senior engineer and Structures Team Leader at BRANZ. He points to BRANZ research where the resilience of timber-framed homes and school buildings has been physically tested to confirm the engineering view that timber-framed buildings have strength greater than calculations might suggest.

Across the country, relocations involve both recycling existing houses and moving new transportable homes to their final location. For recycled houses, weatherboard homes are often moved intact or cut into two or three parts. Where brick veneer homes are moved, the bricks are taken down before the move. (If brick veneer walls are required in the new location, a continuous foundation will be needed.)

Most recycled homes were originally set on pile foundations but homes on slab foundations can also be relocated, with the house being disconnected from the slab first.

Wooden-framed houses are great candidates for moving.

Site selection

Both the intended site for the relocated house and the access to it need to be suitable. Contact a relocation company to check site suitability and talk with insurers to check they will insure the house in the new location. In some cases, a geotech report will be required for the site, which ideally will have good solar access and low risks of flooding, landslides or other hazards.

Some new subdivisions impose covenants that do not allow relocation of a second-hand house. Building consent authorities (BCAs) may also have their own specific restrictions.

Building Code requirements and building consent

Section 17 of the Building Act requires that all building work must comply with the Building Code to the extent required by the Act. 'Building work' includes work typically involved with relocations such as the construction of timber pile foundations, drainage and stormwater connections or on-site treatment/disposal.

The relocated building does not need to be entirely brought up to current Building Code requirements.

- Relocating a building onto or within a site does not by itself constitute building work. (MBIE Determinations 2021/005 4.2.3 and 2019/047 4.3.4).
- Section 112 of the Building Act covers building work that relates to alterations to an existing building. For certain provisions (means of escape from fire, access and facilities for people with disabilities), altered buildings must comply 'as near as is reasonably practicable' with the Building Code. In all other respects, the altered building must continue to comply with the Building Code to at least the extent that it did before the alterations.
- For work following the relocation, the BCA is only required to be satisfied that the new building work will comply with the Building Code and that proposed alterations would not reduce any level of Code compliance that the building already has.

A building consent will usually be required. The BCA will need to see plans for new building work that needs consent (such as foundations) that comply with the new location's performance requirements for structure and durability. This will include consideration of:

- wind zone – especially if the house is moving from a lower wind zone to a higher wind zone
- earthquake zone – especially if the house is moving from a lower earthquake zone to a zone of higher risk
- exposure (corrosion) zone – especially if the new location is coastal, where stainless steel foundation fixings will be required.

For homes built or altered in the past 40 years or so, the local council will often hold records of the bracing design plan. This can help with calculating whether additional bracing is required for the site.

There are often no detailed records for houses older than this (that pre-date NZS 3604:1978 *Code of practice for light timber frame buildings not requiring specific design*). BRANZ has helpful resources:

- *Evaluating walls for their bracing value* in *Build* 199.
- BRANZ Study Report SR305 *Bracing ratings for non-proprietarybracing walls.*
- BRANZ Study Report SR119 *Full-sized house cyclic racking test*.

Other Building Code requirements

The relocated building will also need a building consent for the new plumbing, drainage and stormwater connections to council services (or on-site wastewater treatment/stormwater disposal). Other Building Code clauses will need to be addressed where applicable, including:

- C *Fire safety*, requiring the installation of interconnected smoke alarms (this applies to alterations as well as new building work)
- D1 *Access routes,* for public access to the building and stair design
- F2 *Hazardous building materials*, for glazing (only if altered), for example
- F4 *Safety from falling,* for barriers around new decks, for example
- H1 *Energy efficiency*, for thermal performance requirements in new building work.

In some cases, a resource consent for the move may be required but not where relocating a house is a permitted activity in the district plan.

Some BCAs have their own requirements around relocating second-hand buildings. For example, Auckland Council requires a written report from a third party that includes details of the structural integrity and condition of the building, how it will be relocated, whether asbestos is present and whether fumigation will be required.

In some cases, councils may ask for a bond if the house is not scheduled to be reinstated within the permitted timeframe in the district plan. The bond would be repaid after agreed work is completed. Councils also commonly charge development costs or building impact fees.

Finding information

NZS 3604:2011 *Timber-framed buildings* has details about site requirements (section 3), exposure zones (4.2), wind bracing demand (5.2) and earthquake bracing demand (5.3). The Acceptable Solutions and Verification Methods for Building Code clause B1 *Structure* also have a definition of good ground. Climate zones for calculating thermal performance can be found in Acceptable Solution H1/AS1.

For any specific location, BRANZ Maps identifies the earthquake zone, corrosion zone, climate zone and maximum expected rainfall intensity.

Good design

Relocating a home is an opportunity for optimising the orientation of the building on site for passive solar and ventilation design and a more comfortable and resilient home with lower operating costs. For passive warmth, this means a shallow floor plan that is wide, not deep, with an east-west orientation and the living areas facing north. Avoid overheating by using eaves and with good ventilation.

House relocation companies

There are around 45 haulage companies that regularly relocate houses, says Jonathan Bhana-Thomson, Chief Executive of the New Zealand Heavy Haulage Association. In many cases, the relocation company moves the home and also constructs the timber pile foundations. He points out that, as most new homes are built on concrete slabs, relocation firms have more experience at building timber pile foundations than homebuilders.

For the relocation, choose an experienced company and have a contract. Work out who is responsible for each job, including:

- site investigations and commissioning a geotech report if required
- obtaining building consent
- designing and constructing the pile foundations
- insurance for the move – haulage companies have good access to insurance cover – and contract works cover.

Jonathan Bhana-Thomson says relocating a recycled house to a new site can have an all-up cost of just two-thirds that of building new. With a shortage of affordable homes and high levels of waste in the building sector, relocation rather than demolition is a good road to take.

By Jade Kake, Registered Architect, Director, Matakohe Architecture + Urbanism, and Dr Natalie Allen, Managing Director, The Urban Advisory

Where to next for multi-generational housing?

There are many ways to overcome the barriers to multi-generational housing, including more creative tenure models and design choices.

A BRANZ project has delved into barriers to delivering multi-generational housing in Aotearoa New Zealand. The research defined multi-generational housing broadly, encompassing various household structures such as where multiple generations of related adults live together as well as multi-family households from the same generation.

While focused on barriers, the research also explored specific cultural requirements, design requirements and innovative development models.

Penina Trusts multi-generational housing development in Papakura, Auckland.

Tenure models driving design outcomes

Tenure differences significantly impact design requirements. Tenures include multi-generational public rental housing, developer-led market multi-generational housing (including build to rent), resident-led private market new builds and resident-led private market renovations. Mixed-tenure options also exist.

Those involved in developing multi-generational housing expressed concerns about future saleability and what to do if family circumstances and configurations change. Developers talked of innovative housing types such as duplexes with interconnecting doors or two-over-one units, which offer flexibility and the potential for multi-generational living while protecting future saleability or tenancy of individual units.

Build to rent can take a longer-term view, developing a range of flexible alternative models and diverse typologies that can be reconfigured as whānau and community needs change.

Exterior form and site design considerations

Site size and configuration are crucial for multi-generational living, with many developers saying that, in attempting to deliver multi-generational housing, development economics inevitably intersect and at times conflict with design requirements. This can manifest in different ways, depending on density.

Lower-density developments necessarily require a larger footprint, which can present challenges to accessibility and require flatter contiguous pieces of land. For denser developments, the need to increase yield may impact apartment and unit sizes, with the narrower and smaller units considered financially viable failing to meet the needs of whānau living in multi-generational configurations. Balancing universal design requirements and multi-generational living design requirements with density and site constraints requires creative design solutions.

Shared amenity and communal spaces

For lower-density developments (for example, 1–2-storey semi-detached dwellings occupied by a whānau or extended family made up of smaller household clusters), the thoughtful configuration of dwellings in relation to one another is necessary to foster both privacy and a sense of community and togetherness.

Well-designed outdoor areas enhance quality of life and encourage intergenerational connections and are vital for family interaction and play, especially for children. Higher-density developments provide opportunities for amenity space shared at various levels – within multi-generational households, by clusters of dwellings, for the wider development/community and at a neighbourhood or public level such as public parks and reserves.

Interior design considerations

Internal layouts that maximise space and functionality, especially in kitchens and living areas, are essential for multi-generational households. These may include flexible layouts with larger and multiple living spaces, larger and multiple kitchens, larger bedrooms, wider hallways, toilets separate to showers and the selection of hard-wearing and low-maintenance materials.

The need for multiple kitchen spaces presents a challenge to current resource and building consenting requirements and in the calculation of development contributions.

Incorporating universal design features on the ground floor, including a bedroom and accessible entry, bathroom and kitchen, caters to diverse and changing household needs.

Depending on the tenure arrangement, designing dwellings with the ability to make changes to the layout over time through minor alterations may also be desirable.

Specific cultural needs

Specific cultural needs such as those related to tangihanga (funeral rites) in Māori and Pacific cultures should be considered in design and layout. For example, separate spaces for food preparation and consumption from areas for tangihanga may be important for Māori families, while separate toilets from living areas may be important for some Pacific cultures.

Cultural requirements may vary between Māori and various Pacific cultures. However, consistent between these cultural groups is the cultural obligation and desire to accommodate whānau/extended family and the fluctuating occupant numbers that may arise from this arrangement. Flexibility to accommodate whānau dynamics is key.

NOTE The wider research team contributing to the research included Dr Kate Bryson, Jacqueline Paul, Dr Charmaine 'Ilaiū Talei and Greer O'Donnell.

By Steph Panzic, Senior Associate, Sean Gourley, Solicitor, and Matt Murray, Graduate, Dentons NZ Construction and Major Projects team

NZS 3916 is changing – here's what you need to know

Changes proposed to NZS 3916 could, if adopted, shift more risk from design consultants to contractors.

Standard form contracts in Aotearoa are changing. After completing and publishing the new NZS 3910:2023 *Conditions of contract for building and civil engineering construction*, Standards New Zealand is turning its attention to related standards such as NZS 3916:2013 *Conditions of contract for building and civil engineering – Design and construct* and NZS 3917:2013 *Conditions of contract for building and civil engineering – Fixed term.*

Responses being reviewed

A draft of DZ 3916:2025 was published for public consultation in February. The consultation period has now ended and the standards committee is reviewing responses. Once this process is complete, the new NZS 3916 will be published.

Many of the proposed changes are intended to bring NZS 3916 into line with NZS 3910:2023. Key mechanisms introduced in NZS 3910 such as the new roles of contract administrator and independent certifier (which divide the functions previously performed by the engineer) will be adopted into NZS 3916 without further review.

In contrast, other changes carried over from NZS 3910 such as the liability limit in clause 7.2 may warrant further consideration in the design and build context. Consultants' liability limits are likely to differ from those under NZS 3916, creating a gap risk where contractors may face additional liability.

Significant aspects of NZS 3916:2013 also remain unchanged, including the contractor's warranty at clause 5.1.8 that the principal's requirements are suitable, appropriate and adequate. These unamended provisions may be raised during the consultation process for further review.

Key amendments

Several changes are specific to the NZS 3916 contract and have a unique impact on design and build projects that use it. While many of these are beneficial, others introduce what we believe is unnecessary risk transfer. Below, we outline the key amendments in the current draft that are unique to a design and build context.

Definitions (clause 1.2)

'Principal's requirements' have been redefined to the requirements 'included in the contract and identified as the principal's requirements, including the documents and any drawings and specifications listed in contract agreement annexure 1 – list of principal's requirements'. A corresponding annexure is intended to list the principal's requirements in a single place.

This approach should make the contract easier to navigate. However, the current drafting does not guarantee that all the principal's requirements will be listed in annexure 1. Material captured by the broader reference to requirements 'included in the contract' could still be littered throughout the contract documents.

Ideally, this drafting will be tightened with further review to reduce the potential for uncertainty.

Discrepancy (clause 2.2.7)

This clause concerns situations where a discrepancy arises between the actual quantities for measurable items and those appearing in the schedule of prices. The 2013 version of NZS 3916 deals with this situation in clause 2.2.6 by providing for a variation where any discrepancy in the pricing of a single item is such that it would make the schedule for that item or any other items unreasonable.

The key proposed change is that the contractor will now only be able to claim a variation where 'a significant discrepancy has occurred, for which the contractor is

not responsible'. In other words, more risk is shifted onto contractors.

Deeds of novation (clause 4.3.1)

Deeds of novation arise where the principal's existing agreements with design consultants are transferred to the contractor. The 2013 version of NZS 3916 dealt with this situation under clause 4.1.4. The new clause adds a requirement that the principal provide any deeds of novation to the contractor for execution within 10 working days after the tender is accepted.

While this is helpful, a gap remains. There is still no requirement for the principal to execute the deeds, nor are there any consequences for failing to do so. Given the importance of such transfers, it would be preferable to provide the contractor a right to claim a variation where the principal fails to provide executed deeds.

Submission and rejection of design documentation (clauses 5.1.10 and 5.1.11(b))

Under clause 5.1.10, the principal will be able to require that the contractor submits design documentation to the contract administrator at the stages of design development set out in the specific conditions.

Clause 5.1.11(b) requires the contract administrator to include reasons if they reject the design documentation and to only reject if, in their 'reasonable opinion', the documentation is non-compliant with the principal's requirements. These changes are likely to be useful in that the administrator will need to clarify why a design is rejected and ensure there are good reasons for it.

Several changes are specific to the NZS 3916 contract and have a unique impact on design and build projects that use it.

Contractor-arranged professional indemnity insurance (clause 8.6)

One proposed change concerns the length of time that a contractor's professional indemnity insurance must be in place. The timeframe under the 2013 version is until completion plus 5 years. This would change to completion plus 6 years.

The other proposed change would allow insurance to comprise either annual renewable policies or a single policy covering the full period specified above. The current 2013 version generally only permits the single policy option, although it does allow for annual renewable policies until completion of the contract works.

Compliance with variations (clause 9.1.4)

Under this clause, a contractor is required to comply with any variation unless it falls under one of three stated grounds. The proposed amendments would adjust the number of working days for the contractor to notify the contract administrator – and for the contract administrator to amend the instruction – and would remove the 'health and safety in the workplace' ground. Given the importance of health and safety generally, we disagree with its removal here.

Notice of variation (clause 9.2)

Under the revised clause, the contract and contract administrator must 'endeavour to agree' as to whether a matter raised in a notice of variation involves a variation. The contract administrator must then issue an instruction within 10 working days of that agreement. If no agreement can be reached, the issue can be referred for determination by the independent certifier within 20 working days.

This change reflects the introduction of two roles to replace the engineer. Under the 2013 version of NZS 3916, the engineer has sole responsibility for determining this matter and must do so within 1 month of receiving the notice of variation. This process was also revised in NZS 3910:2023 but with different wording.

DZ 3916:2025 introduces shorter timeframes, omits the stage where the contract administrator confirms whether the matter constitutes a variation and proceeds directly to the independent certifier deciding in the absence of agreement.

Once the new NZS 3916 is published, be sure to check it out.

By David Hindley, Freelance Technical Writer

Removing barriers to using overseas building products

The construction industry will soon have easier access to imported building products that are deemed to comply with our Building Code. The government initiative aims to increase supplier competition and drive down costs. Architects, designers and builders must still ensure they're specifying the right product for the job.

The price inflation for building products has slowed markedly in recent months but the cost to build a 3-bedroom home remains over 40% higher than it was in 2019. There is also evidence that construction costs here are higher than in other countries such as Australia.

The Commerce Commission's residential building supplies market study, undertaken at the height of the price inflation in 2022, found that competition for the supply of building materials was not working as well as it could. The study made a number of recommendations, including updating more Acceptable Solutions and Verification Methods, and having more certification schemes that can issue product certificates deemed compliant with the New Zealand Building Code.

Building products and specifications

The government amended the Building Act this year to provide new pathways for overseas building products to be used in New Zealand. A key one is the introduction of the Building Product Specifications – effectively a list of all the building product standards that meet or exceed the Building Code. Sections of the Building Product Specifications will be referenced

New homes overseas often use different construction methods to those we use here and face different environmental risks in areas such as UV exposure, earthquakes and strong winds.

by Acceptable Solutions and Verification Methods to demonstrate compliance for a particular Building Code clause.

MBIE gives an example of how it will work. In H1/AS1, where today it says: 'The thermal resistance (R-values) of insulation materials may be verified by using AS/NZS 4859.1' in future, H1/AS1 will say: 'The thermal resistance (R-values) of insulation materials shall be determined by using the methods in section 3.5.1 of the Building Product Specifications for the given types of insulation'.

The first edition of the Building Product Specifications will not cover all building products. MBIE will update and expand the document regularly to incorporate more building product standards that are currently referenced in Acceptable Solutions and Verification Methods. It will also add overseas building product standards that are assessed as requiring equivalent or better performance.

Welcome move, but devil is in the details

Karla Falloon, BRANZ Director Office of the Chief Executive, says BRANZ is supportive of the new initiatives to reduce costs as long as it does not come at the expense of quality.

Some overseas product certification schemes may be easy for us to accept without problem. For example, much of the plumbing in Australian and New Zealand homes is broadly similar, and the 200,000 products certified under the Australian WaterMark certification scheme may be readily accepted here.

In other areas, MBIE will need to take care ensuring that overseas schemes are relevant to New Zealand.:

- Construction methods vary between countries. While most New Zealand homes have a timber frame and many have timber cladding, in European countries, steel, concrete and brick are more commonly used. The fire risk is very different between timber-framed and clad homes and concrete homes.
- Our climate is our own. For example, the UV Index in New Zealand is commonly around 12 in summer and 13 or more in the Far North (16.8 has been recorded). In the UK, a figure of 8 is rare. Our high UV levels can have a big impact on the durability of exterior materials.
- We're the Shaky Isles. Earthquakes over magnitude 5 are not uncommon – we had 10 in 2023 – while European countries rarely or never experience them. Some of our building materials must provide bracing for earthquakes and wind to a much greater degree than is the case overseas.

Martin Gordon, GM Consultancy Services at BRANZ, says that fire, structure and durability are among the areas of greatest risk with building materials here and our requirements in these areas can be comparatively high. He points out that, if a product has been tested in the UK for 3,000 hours at a certain UV level but the test requirement in New Zealand is for 7,000 hours at a higher UV level, the UK test results won't apply here.

Given BRANZ's work in Appraisals and as a CodeMark assessor and its history supporting standards development, the organisation could potentially have a role to play.

Right place, right installation crucial

BCAs must already accept products and methods with CodeMark certification as being Building Code compliant provided the product or method is used in accordance with details noted on the certificate. This qualification will also apply to newly MBIE-recognised products certified under an overseas certification scheme.

This is an extremely important point. If an architect, designer or builder selects the wrong product for a particular use or it is installed incorrectly, they may be liable if the product fails. The recent amendment to the Building Act provides good-faith liability protection to BCAs regarding the Building Product Specifications and for products certified overseas that are recognised by MBIE.

Will specifiers and importers run with the ball?

As suggested in the article *What opening the market means* in *Build 205*, for higher-risk elements such as cladding or structural components, architects, designers and builders may be reluctant to specify unfamiliar products. Karla Falloon points out that they need to look at systems as a whole to see how new products work in conjunction with the products around them.

Commercial judgement will still apply. We are a comparatively small market, shipping costs are still higher than before COVID and supporting technical literature will need to be developed for New Zealand construction. Importers may not bring in some new products if they consider the likely business will not offset the costs.

By Adam Caccioppoli, HR Consultant, Baker Tilly Staples Rodway Hawke's Bay

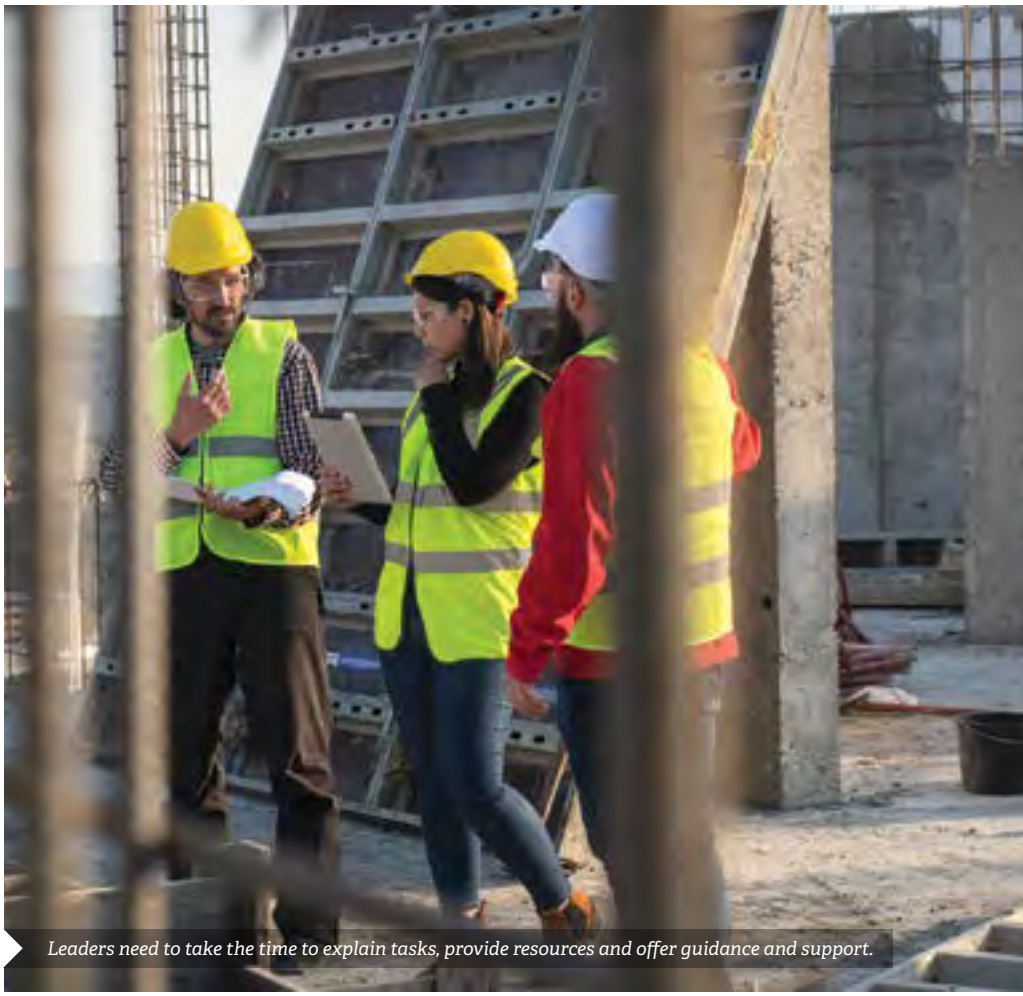
Letting go is hard to do

To keep a business running well, it's important that managers learn how to delegate successfully. While this can be challenging given our Kiwi culture, there are several strategies that can be usefully employed.

Aotearoa New Zealand has a strong DIY culture, which can bleed into leadership styles. Leaders may feel it's more efficient or reliable to just do the task themselves, especially if they're used to being hands on.

Delegation is a growth strategy that costs your business nothing. It doesn't just lighten a leader's workload – it is a powerful strategy that can drive productivity, enhance employee development, foster innovation and improve profitability. Think of it this way – everyone needs to be doing their job for a team to succeed.

It's difficult for construction companies to function smoothly if leaders are doing the work of team members because that leaves them with less time and ability to do their own jobs. Lack of delegation can also lead to leader burnout and negatively impact work-life balance.



Leaders need to take the time to explain tasks, provide resources and offer guidance and support.

Why leaders struggle to delegate in the workplace

Reluctance to delegate can stem from various factors, including personal beliefs, habits, perfectionism, organisational culture and the nature of tasks. Understanding these challenges is the

first step towards overcoming them and fostering a more efficient and empowered workforce.

The fear of losing control

One of the reasons leaders struggle to delegate is the fear of losing control. Leaders, especially of businesses they have built from nothing, understandably feel a sense of ownership over their projects and responsibilities, and entrusting others with these tasks can be unnerving.

Suggested action: Delegating doesn't mean abdicating responsibility or losing control. Effective delegation requires clear communication of expectations, goals and deadlines. If the buck stops with you, make sure you have regular checkpoints with your employees – but not too many otherwise you are micro-managing – to ensure that jobs are being done to standard. Set clear guidelines so they know what their decision-making remit is and where they need to get approval from you before taking the next step.

Lack of trust in team members

Another barrier to delegation is lack of trust in team members. Leaders may doubt the abilities, commitment or judgement of their staff, leading leaders to believe that they are the only ones capable of performing certain tasks correctly. This can be a result of past experiences where delegation led to unsatisfactory outcomes.

Suggested action: If you can't trust your employees to carry out tasks, either provide them with training and development so they get up to speed as soon as possible or make changes to your workforce so you have the competency and commitment you need.

Using a rugby analogy, if your goal kicker is only able to kick at a 50% success rate, action needs to be taken. Choosing to do nothing and continuing to do it all yourself will see you stay on the merry-go-round of overwork and burnout and result in high employee turnover and low employee job satisfaction from a lack of development in their positions. Trust is built through doing real work – start delegating but with smaller, less mission-critical projects and tasks and keep upping the ante as you and your staff gain in confidence.

Time constraints

Delegation can be time consuming. Leaders need to take the time to explain tasks, provide resources and offer guidance and support. In demanding, time-sensitive environments like the construction industry, leaders convince themselves that it is quicker and more efficient to complete tasks themselves rather than invest time in delegation. Over time, this is not the case.

Suggested action: Adopt a long-term mindset and delegate properly as one of your business strategies to see what happens. Focus on progress rather than perfection and encourage a culture of continuous improvement.

While delegating tasks may initially slow down progress, it can lead to greater efficiency and productivity as team members develop their skills, take on more responsibilities and let you focus on your core role as a business owner or senior leader – bringing in new business and identifying new revenue streams.

In Aotearoa, there can be a cultural tendency to avoid seeming bossy or arrogant. Some leaders may hesitate to delegate out of fear they'll come across as lazy or superior – even though good delegation is about empowering others. Good delegation improves your sanity!

FOR MORE Contact Baker Tilly Staples Rodway's HR advisory teams in Auckland, Taranaki or Hawke's Bay if you need assistance with leadership training and delegation skills.

By Ministry of Business, Innovation and Employment

Skills maintenance – proposed consent exemption conditions for small standalone dwellings

Earlier this month, the Building Performance team published a checklist of the proposed conditions that must be met when using the small standalone dwellings building consent exemption. This exemption is expected to be in force by early 2026.

This checklist outlines the proposed exemption conditions currently under parliamentary review, so changes may occur.

Small standalone dwellings must have a simple design and meet the Building Code

The building must comply fully with all the relevant requirements of the New Zealand Building Code (NZBC).

- The building must be new and standalone.
- The building must be single storey.
- The building is classified as: Housing – detached dwelling (defined by Clause A1 of the Building Code). This means it must:
  - comply with all the requirements of the Building Code that apply to this classified use
  - be intended for a single household or family.

Building dimensions

- The net floor area must be no greater than 70 square metres.
- The building must have:
  - a maximum floor level of 1 metre above ground.
  - a maximum height of 4 metres above the floor level.
- The building must be 2 metres or more away from any other structure or legal boundary.

Construction material

- The building must be designed and built using lightweight building products for the roof.
- The frame must be built using light steel or light timber.
- Wall cladding must have a weight not exceeding 220 kg/m^2.

Homeowners must notify their council before they start to build and when building is complete.

Amenities

- Plumbing and drainage works should be simple and designed and built in accordance with the Acceptable Solutions for compliance with these clauses of the Building Code:
  - Clause E1
  - Clause G12

- The building must have:
  - interconnected smoke alarms throughout
  - independent points of supply for electricity and gas (where applicable), and
  - electric or gas heaters.
- Level-entry showers are permitted only once a relevant licence class has been established.

Building practitioners

- All work on a building must be carried out or supervised by licensed building professionals (licensed building practitioners, licensed plumbers, drainlayers, gasfitters and electricians).
- All building work must have a Record of Work (RoW), Certificate of Work (CoW) and energy work certificate:
  - A new record of work form is proposed for plumbing and drain laying work on exempt small standalone dwellings.
  - For small standalone dwellings, energy work certificates may include certificates of compliance, electrical safety certificates and gas safety certificates.

Council notification

Homeowners must notify their council before they start to build and when building is complete.

- Intention to build must be notified to council via a request for a Project Information Memorandum (PIM). This will be through a new or updated PIM form. This enables councils to share relevant information with owners and supports the collection of development contributions.
- Councils must advise homeowners on whether the proposed building work is likely, unlikely or uncertain to meet the proposed building consent exemption. However, this is not an approval process and homeowners can choose to build irrespective of council advice.
- Homeowners must provide councils, on completion of work, a set of plans (for both building and plumbing and drainage work). These plans must include any changes that occurred between the initial design and the completion of the build. This is an administrative process and councils cannot review built plans to determine if a small standalone dwelling complies with the Building Code.

FOR MORE

See *Proposed building consent exemption conditions for small standalone dwellings* — Building Performance.

- Choosing to build on land where a natural hazard exists, as defined by section 71(3) of the Building Act 2004, may require a building consent. This is unless adequate provision has been made to protect the land, building work, or other property from the natural hazard.
- Owners must meet all building consent exemption conditions. Otherwise, owners are required to get a building consent. Existing building work underway is not eligible to be exempt from requiring a building consent. Councils retain their existing powers to address non-compliant building work.

Take the time to learn about the changes so you can help your clients prepare for the new rules.

Quiz

1. **What is the maximum size of a small standalone dwelling under the proposed exemptions?**
   a. 50 m^2
   b. 60 m^2
   c. 70 m^2

2. **The plumbing and drainage work should be simple, and some of that must comply with Clause E1 of the Building Code. What does Clause E1 refer to?**
   a. Plumbing
   b. Surface water
   c. Drainage
   d. External moisture

3. **Who must carry out or supervise the work on small standalone dwellings?**
   a. Licensed electricians
   b. Licensed plumbers, gasfitters, and drainlayers
   c. Licensed building practitioners
   d. All the above

4. **All building work, in relation to the exemption, must have a Record of Work (RoW), a Certificate of Work (CoW), and energy work certificate.**
   a. True
   b. False

Answers: 1. c, 2. b, 3. d, 4. a.

By Ministry of Business, Innovation and Employment

Skills maintenance – are you managing your retention money properly?

The retention provisions in the Construction Contracts Act 2002 were put in place to protect retention money owed to subcontractors in the event of a business failure, and to ensure retention money withheld under construction contracts is responsibly managed.

Every worker and small businessperson deserves to be paid for their work, and subcontractors need to feel confident that they will be paid what they are owed. Whether you regularly work as a head contractor, a subcontractor, or both, it is important that LBPs understand their rights and obligations under the Construction Contracts Act.

The Construction Contracts Act was strengthened in April 2023 to provide extra protection for subcontractors, if a head contractor chooses to hold retention money.

Understanding retention money

In practice, retention money is usually withheld by a head contractor, as an assurance that the subcontractor will complete their work to the agreed standard. The subcontractor has up to 12 months after the job is finished to fix any defects in their work.

However, if a head contractor spends the money they are retaining as retention money, and then becomes insolvent, the subcontractor could lose their money.

The strengthening of the Construction Contracts Act is designed to make sure subcontractors still get the money they are owed in the event of an insolvency. This means both contractors and subcontractors can trust that work will be completed promptly to the terms of the contract, and everyone will be paid what they are owed when the job is finished.

Retention money isn't mandatory

It is not a requirement to hold retention money. Head contractors who choose to hold retention money typically hold between 2 and 10% of the contract value, for up to 12 months after the job is finished.

This money can then be used by the head contractor to remedy

The Construction Contracts Act was strengthened in April 2023 to provide extra protection for subcontractors.

defects by the subcontractor, assuming this is permitted by their contract, and 10 working days' advance notice is given in writing.

The Construction Contracts Act does not set a minimum contract amount for retention money to apply. This means the rules and requirements apply to all retention money withheld under commercial construction contracts in Aotearoa New Zealand.

Understanding the requirements to hold retention money

By law, the head contractor (who holds the retention money) must hold the retention money in trust. They must also provide reports to the subcontractor, when requested.

The requirements to hold retention money include:

- ensuring that retention money held as cash is also held separately in a bank account with prescribed ledger accounts
- using retention money only to rectify non-performance of subcontractors' obligations under the contracts
- providing quarterly reports to each subcontractor retention money is withheld from
- providing each subcontractor with a report after each transaction with their retention money, promptly and free of charge.

It is also a requirement for retention money to be paid out as soon as it is owed on completion of the contract – if payments are late, interest can be charged by the subcontractor.

Whatever you put in your contract about retention money, you can't change your obligations under the Construction Contracts Act, even if you add terms that go against it.

Offences and penalties have been updated

When the Construction Contracts (Retention Money) Amendment Act was passed, it also introduced offences and penalties for companies and in some cases, directors, who fail to hold retention money on trust.

Offences have been introduced for:

- providing false information on retention money
- failure to comply with accounting, recording and reporting requirements
- use of retention money for a purpose other than fixing defects in the subcontractor's performance
- failure to provide regular information to the subcontractor on retention money.

Ministry of Business, Innovation & Employment (MBIE) has provided information and education for LBPs to help you better understand your rights and obligations, no matter what side of the job you are on.

For more information, visit the MBIE building performance website or use the QR codes provided.

If a head contractor is not fulfilling their obligations and is in breach of the retention money regime, subcontractors have a right to lodge a complaint with MBIE. A complaints form can be found on MBIE's website under breaches of the retention regime.

In the next issue, we plan a deeper dive into the subcontractor side of the retention money regime – look out for it.

FOR MORE

Construction Contracts Act 2002

Retention money resources

Breaches of the retention regime complaints form

Quiz

1. **What is retention money?**
   a. Money that is usually withheld by a head contractor, as an assurance that the subcontractor will complete their work to the agreed standard.
   b. Money kept by a contractor to cover unforeseen material costs.
   c. Money held by a subcontractor in case they don't get paid at the end of a job.
   d. Money used to build a retaining wall.

2. **Where must retention money be kept?**
   a. In cash in your desk drawer.
   b. In a separate bank account with prescribed ledger accounts.
   c. In your company bank account, mixed with your other assets.
   d. In your personal bank account.

3. **Which of these is NOT an offence under the Construction Contracts (Retention Money) Amendment Act?**
   a. Providing false information on retention money.
   b. Failure to comply with accounting, recording and reporting requirements.
   c. Paying out retention money in full on the completion of a contract.
   d. Use of retention money for a purpose other than remedying defects in the subcontractor's performance

Answers: 1. a, 2. b, 3. c.

By Colin Barkus, Principal Writer

Waste wood woes

Far too much timber building waste ends up in landfill. BRANZ and its industry partners are tackling this complex problem on several fronts.

The statistics are stark – and well documented. Construction and demolition waste makes up 40–50% of all waste going to landfill in Aotearoa New Zealand, and around 20% of that is timber.

'Many in the sector acknowledge the problem and urgently want to do something about it,' says Dr Casimir MacGregor, who leads BRANZ's sustainability and zero-carbon research programmes.

'But while options for reusing or recycling waste timber exist, they're not well known and the perception is that it's easier, cheaper and faster just to dump it.'

Dumped timber can exact a particularly high environmental price.

Why does it matter?

All construction waste comes at an environmental, financial and social cost.

Dumped timber can exact a particularly high environmental price. Much of it is treated with chromated copper arsenate (CCA) – a chemical preparation that preserves the timber but can be harmful to human and environmental health if the timber is burned or the CCA leaches out.

'Almost all waste timber gets tossed in the skip because most builders know that CCA-treated timber can't be recycled or burned – and it can be difficult to determine on site what's CCA-treated and what's not,' Casimir says.

Furthermore, construction waste causes significant greenhouse gas (GHG) emissions. It's estimated that landfills are responsible for 4% of Aotearoa's total GHG emissions, and timber's contribution to that figure is still being assessed. Recent research led by Massey University highlighted how carbon emissions from timber vary significantly depending on when in its life cycle it is removed from use and placed in landfill. There's still much more to learn.

In direct financial terms, there's the cost of transporting waste to landfills and operating and maintaining those landfills as well as the cost of manufacturing and buying new products when existing materials might be suitable for reuse.

Social costs include noise, dust and traffic pollution as waste is transported as well as the possible detrimental health effects of hazardous or nuisance waste.

Is there an answer?

'There are steps you can take to manage waste timber – not all of which involve additional costs. In some cases, where timber can be reused, cost savings will occur,' says Casimir.

Sort it first

Sorting waste timber on site is an essential first step. The range of treated and untreated timber products typically used on our building sites includes framing, cladding, interior fittings and linings, engineered timber products (for example, MDF, fibreboard and particleboard), joinery, panels, pallets and packaging.

'Finding the space on a crowded building site to separate timber types can be challenging, but often small, inexpensive containers will work well,' Casimir says. 'It can also be tricky to keep track of what goes into each pile or container, so BRANZ has developed signs that builders can use to label different waste piles or containers on site.'

The signs are free to download and – reflecting the diverse nationalities working in our building industry – bilingual. Language options currently available are English and Māori, English and Samoan, English and Tongan, English and Tagalog, English and traditional Chinese and English and simplified Chinese. In addition, a template allows builders to create their own signs based on the specific needs of a project. Use the QR code below to view and download the signs and template.

'Another challenge is that it can often be difficult to determine by eye whether waste timber is treated or untreated – particularly if the timber has weathered,' Casimir adds.

'BRANZ recognises this and has recently researched technologies that might help.' (See sidebar: What lies within?)

What can be reused?

After sorting, knowing what to do with different types of timber waste is key:

- Untreated timber – keep any lengths greater than 600 mm for reuse. Collect all types of untreated timber without finishing (paint and varnish) that are not good enough to reuse, then burn, mulch or recycle them.
- Treated timber – reuse lengths greater than 600 mm (or 450 mm if this is the spacing between studs in the structural framing of your project).
- Engineered timber products, trellis and other timber products – reuse or recycle panels larger than 0.5 m^2.
- Treated or untreated heavy timbers and posts – reuse.

Inevitably, some timber building waste won't be suitable for recycling or reuse.

A growing number of facilities around the country now accept, sort and recycle building waste. BRANZ has developed an interactive resource recovery map (part of its REBRI waste management toolkit) to help builders find their nearest facility and identify which materials they can drop off.

More research needed

Casimir says that more research is needed to acquire knowledge and develop strategies to address the timber building waste problem. BRANZ has funding available for a new research scholarship in this field – interested candidates should contact casimir.macgregor@branz.co.nz

FOR MORE

View and download bilingual waste sorting signs

What lies within?

A recent research project looked at the suitability and effectiveness of various techniques and technologies for identifying treated and untreated timber.

The simplest technology of all – the eye – is convenient when timber is new or has been exposed to the elements for only a short time. Colours, markings or tags on the surface of timber can be used to differentiate CCA-treated samples from untreated samples or samples treated with other preservatives.

When these instant visual cues aren't available, chemical solutions can be applied that indicate the presence of specific metallic components by displaying different colours on the surface of the timber. Efforts are now being made to improve their efficiency and accuracy, particularly on timber that is highly weathered, treated with low levels of preservative or recovered in large quantities from complex or unknown sources.

Techniques using X-ray fluorescence spectrometry, laser-induced breakdown spectroscopy or near-infrared spectroscopy can identify the type and quantity of various elements present in timber – even at very low concentrations. These techniques are showing promise overseas for fast, cost-effective in-line sorting of timber waste. However, significant improvements in their accuracy and a thorough analysis of their commercial feasibility are required before they are likely to be seen at timber waste disposal and recycling facilities here.

BRANZ

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Manatū Mō Te Taiao

rebri | reducing building material waste

Find a place to take your building waste

branz.co.nz/resource-recovery-map

BRANZ evaluates building products and systems to ensure they are fit for purpose. Details of recently issued and reissued BRANZ Appraisals follow. For the latest official list of valid Appraisals, please refer to the BRANZ website at www.branz.co.nz.

New Appraisals

Ventia Iron Black Self Adhesive Wall Underlay

APPRAISAL NO. 1258

Ventia Iron Black Self Adhesive Wall Underlay is a self-adhesive, synthetic underlay for use over rigid wall underlays under cavity or direct-fixed wall claddings.

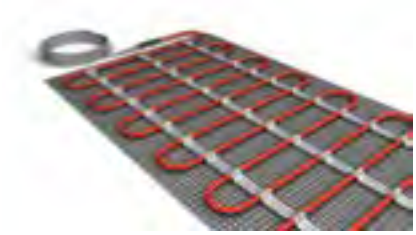
For more, contact E Built NZ Ltd
Tel: 09 916 6750 | Web: www.ebuilt.co.nz

Seratone® AQUA PLUS® Wall and Ceiling Linings

APPRAISAL NO. 1286

Seratone® AQUA PLUS® Wall and Ceiling Linings are pre-finished mineral composite panels.

For more, contact Fletcher Building Products Ltd t/a Laminex New Zealand
Tel: 0800 303 606 | Web: www.laminex.co.nz



Everdry Undertile Heating

APPRAISAL NO. 1289

Everdry Undertile Heating is an electric heating system intended for floor surface warming of stone and ceramic tile finishes in residential and commercial buildings, including wet areas.

For more, contact Everdry Waterproofing Ltd
Tel: 03 332 9130 | Web: www.everdry.co.nz

Reissued Appraisals

StoTherm Insulated Facade System

Appraisal No. 478

StoTherm Insulated Facade System is a cavity-based exterior insulation and finishing system (EIFS) wall cladding. It is designed to be used as an external cladding system for residential and light commercial type buildings where domestic construction techniques are used.

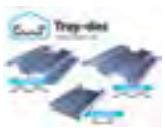
For more, contact Stoanz Ltd
Ph: 04 801 7794
Web: www.sto.co.nz

ADESO® – Adesoguard, REOXTHENE TECHNOLOGY® Easy Lift, REOXTHENE TECHNOLOGY® Bitulight and REOXTHENE TECHNOLOGY® Polyflex Light Damp Proof (DPM) Membranes

Appraisal No. 804

ADESO® – Adesoguard, REOXTHENE TECHNOLOGY® Easy Lift, REOXTHENE TECHNOLOGY® Bitulight and REOXTHENE TECHNOLOGY® Polyflex Light Damp Proof (DPM) Membranes are self-adhesive and torch-applied bitumen-based damp-proof membranes for basement retaining walls and floors. They are applied under floor slabs and foundations and to the exterior face of basement retaining walls to prevent water vapour penetrating to the interior face in spaces where moisture may cause damage.

For more, contact MBP (NZ) Ltd
Ph: 09 921 1994
Web: www.MBPLtd.co.nz



Tray-dec Flooring System

Appraisal No. 841

The Tray-dec Flooring System comprises Tray-dec 80, Tray-dec 60 and Tray-dec 300, which are roll-formed, interlocking galvanised steel trays used as permanent formwork for composite reinforced concrete floor slabs.

For more, contact Tray-dec NZ Ltd
Ph: 09 820 9133
Web: www.traydec.nz

MultiCom® Wall Panel System

Appraisal No. 869

The MultiCom® Wall Panel System is a pre-finished wall lining system that incorporates panels manufactured from compact laminates.

For more, contact Resco Ltd
Ph: 0800 800 950
Web: www.resco.co.nz

Markon SpaceMate™ waste traps

Appraisal No. 963

Markon SpaceMate™ waste traps are low-profile basin water traps manufactured of polypropylene in 32 and 40 mm sizes.

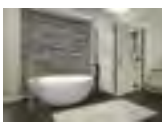
For more, contact Markon Holdings Ltd
Ph: 09 575 7401
Web: www.spacemate.co.nz

GIB Weatherline® Rigid Air Barrier Systems

Appraisal No. 1048

GIB Weatherline® is an exterior-grade, glass-fibre, fleece-wrapped, modified gypsum core sheet material for use as a rigid wall underlay and temporary weather protecting sheathing. The product is also for use in wall bracing and fire-rated systems.

For more, contact Winstone Wallboards Ltd
Ph: 09 633 0100
Web: www.gib.co.nz



Showerwell Tile Safe Shower System

Appraisal No. 1053

The Showerwell Tile Safe Shower System is a preformed shower base and shower wall lining system to be used as substrates for ceramic or stone tile internal wet area showers.

For more, contact Showerwell Home Products Ltd
Ph: 09 845 8212
Web: www.showerwell.co.nz

Reissued Appraisals

Rooflogic Ultraflex TPO Membranes

Appraisal No. 1057

Rooflogic Ultraflex TPO Membranes are single-ply, polyester fabric reinforced, thermoplastic polyolefin (TPO) fully bonded and mechanically fastened waterproofing sheet membranes for roofs and decks.

For more, contact Rooflogic Ltd
Ph: 04 475 7663
Web: www.rooflogic.co.nz

Allproof Passive Fire Protection Products

Appraisal No. 1088

The Allproof range of passive fire protection products include:

- Low Profile Fire Collars
- Cast In Fire Collars
- Drop In Fire Collars
- Pipe Wraps
- Wallthrough
- Fire Plate

For more, contact Allproof Industries NZ Ltd
Ph: 09 481 8020
Web: www.allproof.co.nz

TemperTherm Polyester Insulation

Appraisal No. 1090

TemperTherm Polyester Insulation is a range of thermal insulating materials manufactured from thermally bonded polyester fibres. TemperTherm Polyester Insulation is available in blanket/roll, panel, slab and segment form to suit a wide range of thermal insulation requirements and framing set-outs in walls, ceilings and roofs of buildings.

For more, contact PIL Group Ltd
Ph: 07 282 1184
Web: www.pilgroup.co.nz

TemperTherm Polyester Underfloor Insulation

Appraisal No. 1091

TemperTherm Polyester Underfloor Insulation is manufactured from thermally bonded polyester fibres and is for use in suspended timber-framed floors.

For more, contact PIL Group Ltd
Ph: 07 282 1184
Web: www.pilgroup.co.nz

Premier Polyester Insulation

Appraisal No. 1097

Premier Polyester Insulation is a range of thermal insulating materials manufactured from thermally bonded polyester fibres. Premier Polyester Insulation is available in blanket/roll, panel, slab and segment form to suit a wide range of thermal insulation requirements and framing set-outs in walls, ceilings and roofs of buildings.

For more, contact PIL Group Ltd
Ph: 07 282 1184
Web: www.pilgroup.co.nz

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To be in to win, see details below.

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You can also post your entry to: Build Editor, Freepost BRANZ, Private Bag 50 908, Porirua 5240 if you prefer.

Entries close on 31 July 2025. The first correct entry drawn wins. The Editor's decision is final. No employees of BRANZ or their relations may enter. Congratulations to the latest winner, Alex McHardy from Waipukurau.

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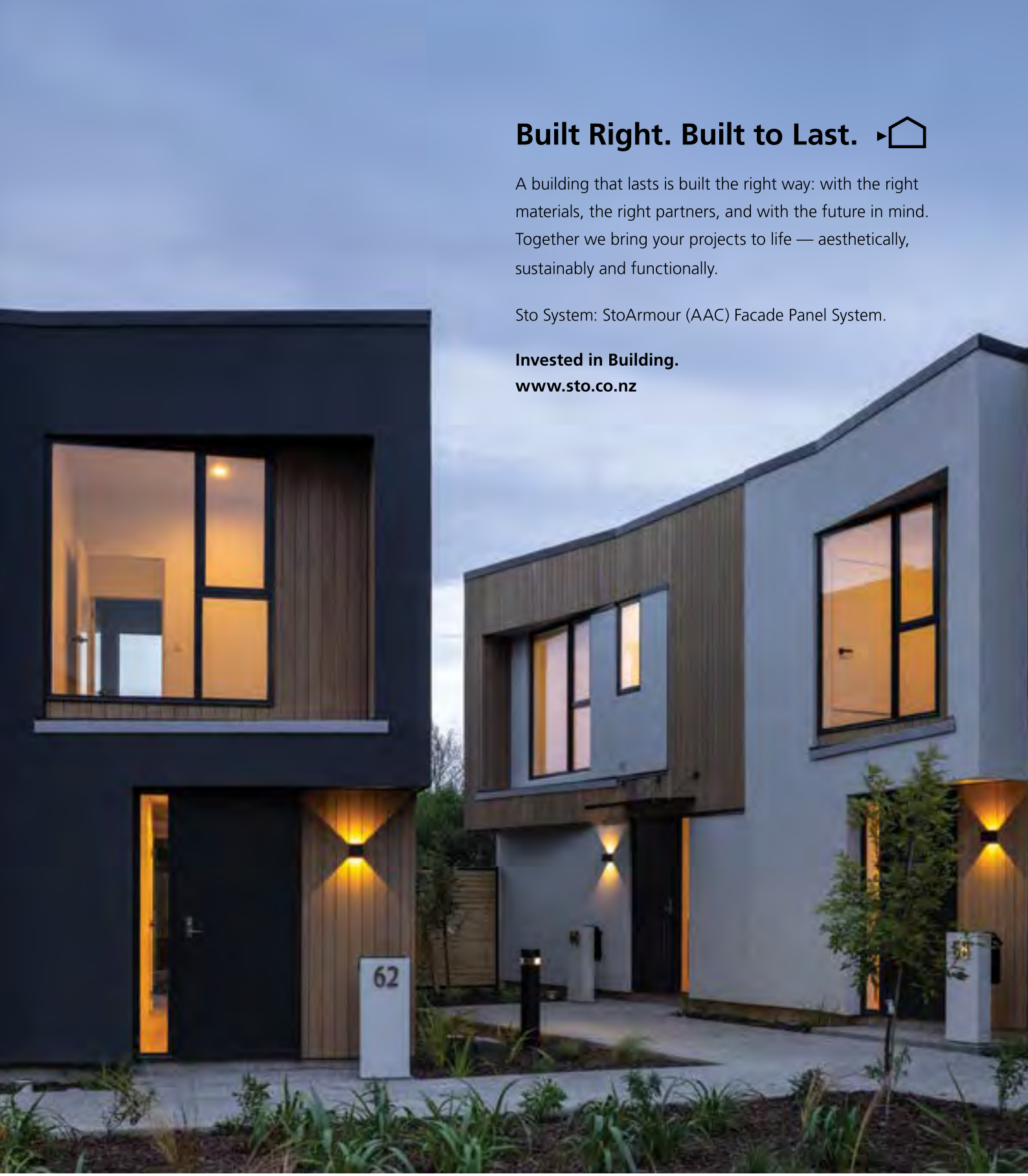

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