SCOPE

ISSUE 62

NZ METAL ROOFING MANUFACTURERS INC.

Welcome to the 62nd edition of Scope, where we take a closer look at the ideas, innovations and individuals shaping the future of metal roofing and cladding in New Zealand. In these pages you'll find everything from standout residential and commercial projects to a deep dive into the technical intricacies of potable water.

Tom Marshall, President, NZMRM

Do you have a project you'd like to submit for publication in Scope? Please click on the link.

Scope is the official publication of The NZ Metal Roofing Manufacturers Inc.

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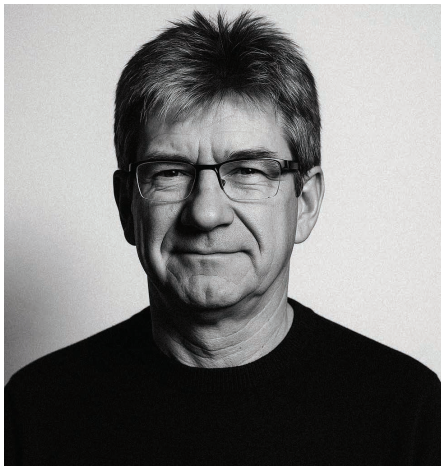

Below is a brief introduction to the executive of The Metal Roofing Manufacturers Inc. It is intended that Scope be representative of the Metal Roofing and Cladding Industry in both commercial and residential sectors. Your submission of material you consider is of interest is welcomed be it design, research, manufacture or construction.

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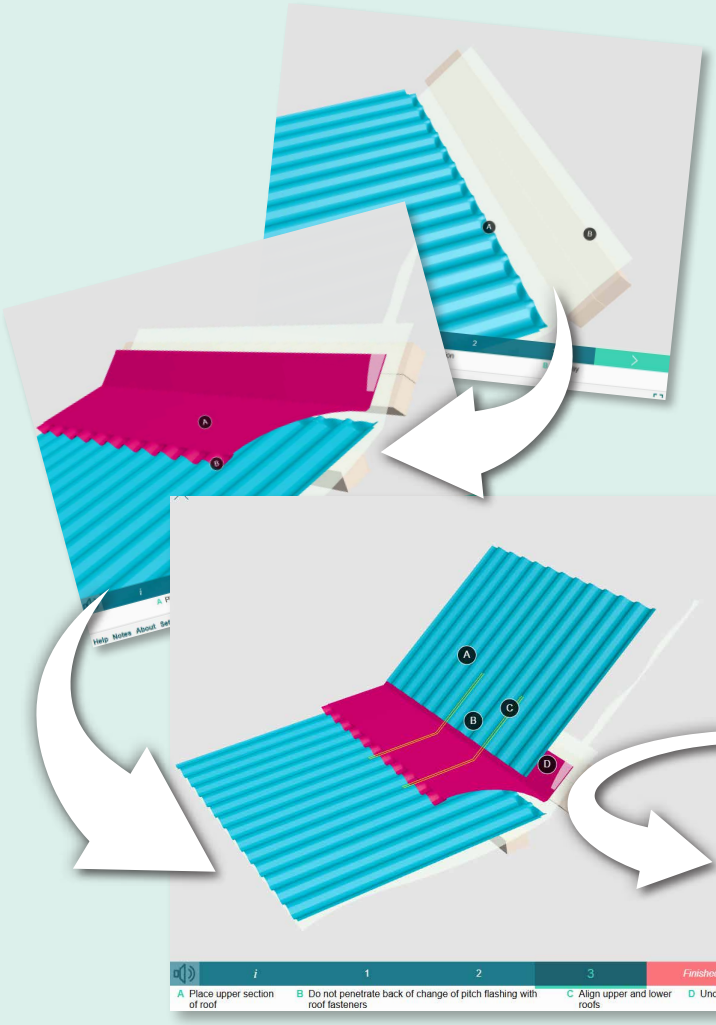

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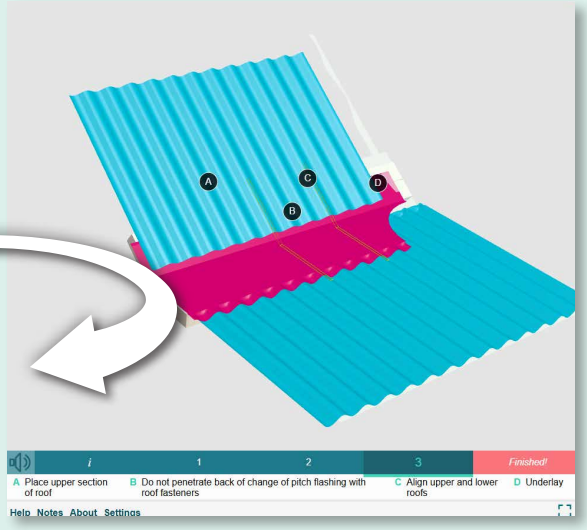

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Ruapehu Hut

Whether they have made the climb themselves or simply seen enticing images, most New Zealanders are familiar with the red corrugate-clad, elongated form of huts like the Mueller in Aoraki Mt Cook and the Brewster in Mt Aspiring National Park.

Insta-worthiness aside, the Scoria colour is predominantly chosen for the roof and walls to increase visibility in adverse weather, with COLORSTEEL® chosen as a sturdy material that can withstand the elements, while being lightweight enough to transport to remote locations.

For the Wellington-based owners of this escape pad at the foot of Mt Ruapehu, it was not only the cladding but also the simplicity of the huts that they wanted to reflect here. They called upon Diego Marangoni of residential architecture studio Arkhē to create their Scoria-clad, pared-back design.

"They wanted a mountain base for winter activities and hiking, which they enjoy as a family," says Diego. "The pragmatic program of space works hard, and the hut is both unpretentious and robust."

A breezeway provides space for firewood and to cast off wet outdoor gear. This connects to a central living space on one side, which is lined appropriately in ply, with a fireplace creating a central gathering spot for the evenings.

"The hut is double-glazed and well-insulated, with the ply providing an easy-to-maintain wall surface. There's a little jolt of colour in the green IMO kitchen, which was a contribution from the client. With its stainless steel top, it's very fitting for the aesthetic of the hut, and it brings a bit of joy to that space."

“The architectural language of cabins with long, pragmatic floor plans and corrugated cladding is the right response here. It feels as though it belongs in the landscape.”

An oversized children's bunkroom is accessible by crossing the breezeway. This is designed to give the parents a level of separation from the children, while also providing young ones freedom to let loose with their friends.

The home's east-facing orientation allows for large windows looking out at the mountain view. In contrast, windows are limited on the western and southern facades to prevent both overheating in the summer and heat loss in the winter.

For Diego, this project was something of a dream come true, with a client who understood the environment and the architectural language that would sit well within it.

"Even if the client didn't bring these DOC hut references to their brief, we'd still compel them and try to educate them on this local and rural vernacular. The architectural language of cabins with long, pragmatic floor plans and corrugated cladding is the right response here. It feels as though it belongs in the landscape."

P

Ruapehu Hut

CREDITS

Designer
Arkhē / Diego Marangoni

Rollformer
Wanganui Steelformers

Roofer
JFS Construction

Builder
JFS Construction

Colour
COLORSTEEL® Scoria

Profile
Corrugated / Custom Orb

Photographer
Diego Marangoni

Beachside home reimagined

In the midst of Mt Maunganui's busy main street is an unassuming glass door leading upstairs to a small studio space. Bright yellow splashes of colour create a vibrant atmosphere in the entry hall, where a feature wall is decorated with building designs and concepts. This is the home of ATA, an architectural design studio headed by Adam Taylor.

For the past 12 years, Adam has been at the helm of his own studio, first operating under the name Adam Taylor Architecture, which later rebranded as ATA. The foundation of ATA's style is built on equilibrium, drawing in all the elements of design to create a balanced rhythm within each project. This design ethos is paired with a sense of freshness, with each plan introducing new elements and inspirations to complement the vision.

ATA's design is widely recognised, with appearances in national architectural publications and multiple awards adorning the office. The team of 5 are proud of their achievements, as Adam reflects, "We've been lucky enough to win a few national awards through ADNZ. It's great to get recognition for the work you've done, for both yourself and for the team."

A prominent project ATA has been working on is the remediation of an existing beachfront property in Mt Maunganui. The client and her builder reached out to Adam to explore options for upgrading the appearance and performance of the structure, which was struggling to cope with the property's environmental conditions.

As a key part of the brief, the client wanted a refreshed, modern roof while still retaining the home's timeless nature.

The project evolved throughout the design process, culminating in a full reclad of the first floor, a redesigned deck and balustrades, and a complete rework of the roof. The original roof was a concrete tile design, with a large stainless steel fascia. The roof planes and valleys channelled water through to internal gutters, which were undersized for the roof capacity in particularly heavy downpours. This ultimately led to water ingress issues over time.

The new roof design increased the internal gutter size and spouting, allowing for a larger water capacity, which protected the roof structure from flooding. The increased internal gutter size created a larger overhang of the eaves, resulting in a greater visual impact on the roof and its design.

Light flow was integral to the home's design. Windows in the northwest and beach-facing walls are complemented by skylights and a gable-end window in the roof, allowing for a natural glow throughout the house. The original building design featured a prominent chimney obstructing the gable end window, and Adam's redesign removed it to allow for a more balanced light in the living space. Complementing the natural light flow, the home features a warm roof design, accentuated by a geometrically angled ceiling. This ceiling creates a subtle texture to an otherwise minimalist room.

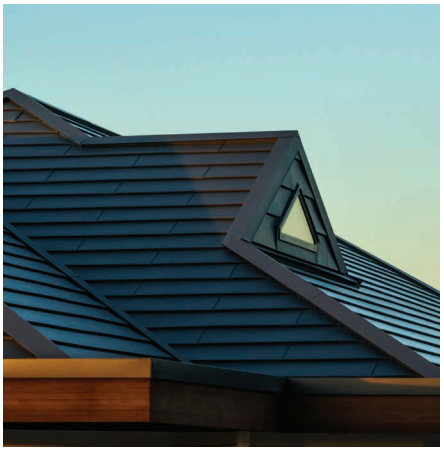
Key to the brief, the client wanted a refreshed, modern roof while still retaining the home's timeless nature. Adam explains, "In terms of where we wanted to go architecturally, we wanted something regular, rectangular and quite striking. We'd been referencing images of slate roofs, but we just didn't have the ability to be able to absorb a weight like that, so that's where a steel tile really comes into its own in terms of a project like this".

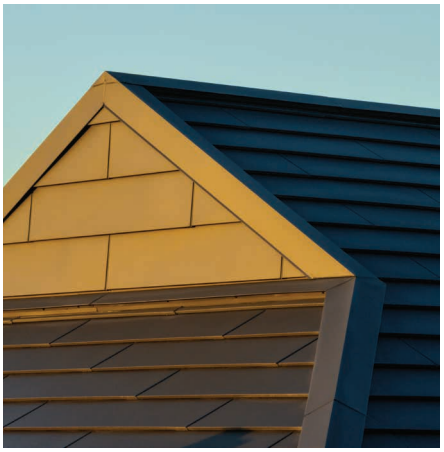
Adam's passion for new materials and designs led him to Gerard's latest roof panel release, Calibre. It had the style and look the client was looking for in the new roof, giving a luxurious and modern aesthetic to the project.

With a width of just over 1.3m, Calibre's horizontal laying pattern allows for greater flexibility around penetrations, removing the need for backflashing up to the ridge. Bringing the roofing tight in around penetrations, paired with Calibre's panelled appearance, brings a unique aesthetic to the roof planes. As Adam explains, "I like the fact that being a smaller module compared to your typical long run roofs, it breaks up the mass of the roof."

Colour selection was crucial for transforming this home. The original silver and grey fascia/roof combination was replaced by warm timber tones across the fascia. A complementary ebony colour was chosen for the Calibre panels, introducing a striking modern look that retains the project's timelessness. The durability of the paint surface and colour in an aggressive environment, so close to the coast, is crucial for the project to have longevity. Gerard's Calibre panels are made of a thick steel core, protected by a zinc-aluminium alloy coating. After forming, layers of UV-stable colour and protective coatings are applied to ensure a clean, robust finish.

Durability of the paint surface and colour in an aggressive environment so close to the coast is crucial.





Calibre was designed with performance in mind, making it ideal for a location like Mt Maunganui, which endures heavy wind-driven rain and exposure to harsh winds. Calibre utilises a Concealed Fastening (CF) design, which conceals fasteners by hiding them underneath an interlocking nose-to-head lapping method. This creates a strong matrix of panels, protected against wind and water ingress, delivering high functionality in an environment that demands it.

The project now stands finished, transforming a once ageing roof into a refined, welcoming home. Adam says, “Looking at the project now, I’m really happy with how the tile presents aesthetically and how it works with our direction architecturally. I know the client’s really happy with the look, and the performance is there, so all around it’s been a great choice.”

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Beachside home

CREDITS

Architect
ATA

Roofing Manufacturer
Gerard

Roofing Installer
Roofing Systems

Photographer
Simon Devitt

Ngā Mokopuna: The Living Pā

What should the future of learning in Aotearoa look like? For Te Herenga Waka – Victoria University of Wellington, the answer lay in a building that could embody both cultural integrity and environmental leadership.

The result of that vision now stands in the heart of Wellington: Ngā Mokopuna is a powerful symbol of cultural renewal and environmental innovation. Commissioned by the university and designed by Tennent Brown Architects, this 3000 m² building aspires to achieve Living Building Challenge (LBC) certification – one of the most rigorous sustainability standards in the world, granted to only a handful of buildings globally.

Originally known as the Living Pā during its design and construction, the project sits alongside Te Tumu Herenga Waka, the oldest university marae in Aotearoa. The Living Pā was conceived to expand the university's marae complex, and through pursuing the LBC certification, the university signalled its commitment to reinforcing the values of manaakitanga (hospitality, care and respect for people) and kaitiakitanga (guardianship, care and protection for the environment). Fittingly, the building was officially named Ngā Mokopuna when it opened in 2024.

The name Ngā Mokopuna, meaning "the grandchildren", reflects the intergenerational values embedded in the project – honouring the past while building for the future.

The Living Building Challenge demands that every material, system and process contributes to a net-positive impact. For Ngā Mokopuna, this meant not only sourcing non-toxic, ethically produced materials, but also ensuring the building's outer shell could support long-term energy efficiency and climate resilience.

From the outset, the project was ambitious – not just in its environmental goals, but in its technical complexity. The mass timber superstructure pushed fabrication boundaries, requiring new prefabrication strategies and rapid learning curves for all involved. The site itself posed challenges: a condensed footprint on a busy arterial road, within a live university campus of over 22,000 students. Constant coordination between stakeholders was essential to successfully navigate construction around exams, events and public access.

The name Ngā Mokopuna, meaning “the grandchildren”, reflects the intergenerational values embedded in the project.

Among the key contributors was Turfrey, a leading New Zealand contractor specialising in roofing, cladding, plumbing and drainage. Turfrey was responsible for installing both the corrugate cladding in the plant room and a large-scale Equus membrane ‘warm roof’ system, which plays a vital role in the building’s thermal performance and airtightness. In addition, Turfrey installed Corrugate and LT7 profiles from Dimond® Roofing, manufactured in ColorCote®’s MagnaFlow® substrate – a choice that aligned with the project’s sustainability goals.

Brad Turfrey, managing director of Turfrey, reflected on the significance of the project:

“Being part of an LT McGuinness project targeting Living Building Challenge certification reflects Turfrey’s commitment to leading-edge sustainability. It means delivering roofing solutions that meet the world’s most rigorous environmental standards – and helping build a better future, one project at a time.”

With the recent updates to the H1 clause of the New Zealand Building Code, which places greater emphasis on thermal insulation across the building envelope (including roofing), ‘warm roofing’ has become a cornerstone of sustainable design in New Zealand, helping buildings meet higher insulation standards (known as R-values) and reduce condensation risk.

ColorCote’s sustainability commitment is reflected in its Environmental Product Declarations (EPDs), ISO 14001 certification, and Toitū carbonreduce™ accreditation. Beyond the product itself, ColorCote has invested in Near Infrared (NIR) oven technology, replacing traditional gas-fired ovens with a system that heats rapidly and shuts off when not in use – resulting in a 59% reduction in CO_2 emissions per tonne of product painted. This innovation aligns with the Living Building Challenge’s emphasis on low-impact materials and processes, making ColorCote a fitting choice.

Ngā Mokopuna is not just a technical achievement, but also a cultural one. Every design decision was made in consultation with Māori stakeholders, ensuring the building reflects and supports indigenous knowledge systems. The integration of sustainability and culture is not symbolic; it is structural, embedded in the materials, energy systems and spatial layout.

So, what should the future of learning look like in Aotearoa? Ngā Mokopuna offers a compelling answer: a place where environmental responsibility, cultural integrity and technical excellence are not just ideals, but foundations. As the building moves toward full LBC certification, it stands as a living example of how architecture can honour the past, serve the present, and inspire a more sustainable future for generations to come.

Every design decision was made in consultation with Māori stakeholders, ensuring the building reflects and supports indigenous knowledge systems.

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Ngā Mokopuna: The Living Pā

CREDITS

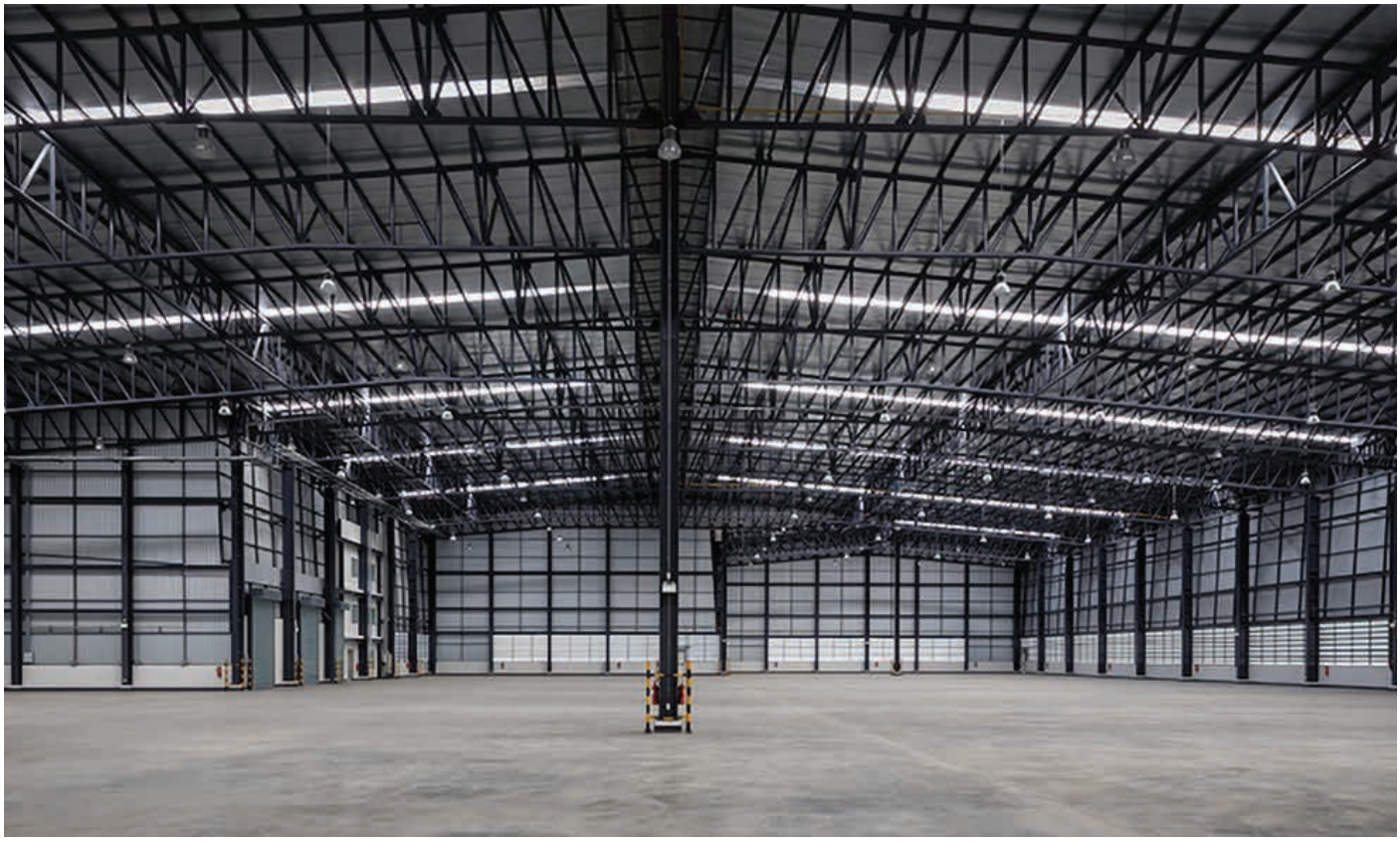
Architect
Tennent Brown Architects

Rollformer
Dimond® Roofing

Roofing Installer
Turfrey

Builder
LT McGuinness

Pre-coated Steel Supplier
ColorCote® MagnaFlow®



New rules for underlays

Over the past year, Kingspan Thermakraft has been investigating cases where synthetic absorbent underlays across various brands in the New Zealand market have shown premature degradation. In some instances, this premature degradation occurred before the warranty period ended. Degradation was found in unlined buildings, such as sheds, canopies, lean-to's, and soffits, often where popular dark-coloured claddings were used.

From October 2024, Kingspan Thermakraft advised the market that applications, such as canopies, lean-to's, soffits and open-bay sheds are not warranted for an underlay. This followed guidance from the NZ Metal Roof and Wall Cladding Code of Practice, Section 10.11.2, which states, "Underlays are not required in unlined structures…".

Identifying the cause of degradation

In collaboration with key industry partners, Kingspan Thermakraft initiated a comprehensive investigation into the underlying causes of the degradation. The investigation involved internal and independent testing through its in-house laboratory team in Auckland and BRANZ, examining its own products as well as underlays from other suppliers.

Initial observations suggested that heat and light exposure were contributing to degradation. Failures typically presented as underlays becoming brittle, flaky, or fragile; symptoms consistent with plastic degradation, rather than chemical damage.

What the testing revealed

To validate these observations, thermal ageing tests were undertaken to simulate long-term performance. Over a 104-day period of heat ageing, replicating 15 years of in-service life, BRANZ tested various products available in the New Zealand market, including Kingspan Thermakraft's Covertek 215, 403 and 405.

The results showed only minor decreases in mechanical strength. Importantly, they all remained waterproof and vapour permeable within acceptable limits. It was noted that heat under darker colour roofs can be as high as 90°C.

Kingspan Thermakraft's in-house laboratory team extended their testing to 210 days, representing 15 to 20 years of ageing. Results mirrored BRANZ's findings across a range of supplier products. However, these tests did not replicate the degradation observed on sites, prompting further investigation into the role of UV exposure.

The role of UV: Direct and Reflected

Research shows that UV light degrades plastic over time. The risk is amplified in industrial or farm buildings, especially those with open roller doors, translucent roofing, or concrete floors that reflect UV.

In New Zealand, underlay suppliers must provide datasheets stating the maximum UV exposure time for roofing and wall underlays before installing cladding. However, it has become clear that in certain applications, underlays are being exposed to direct and indirect UV for extended periods in unlined buildings. This prolonged exposure results in a significant drop in mechanical strength, contributing to early degradation.

Conclusion

BRANZ and Kingspan Thermakraft's testing has shown that:

- Long-term exposure to direct and indirect UV causes significant damage to synthetic absorbent underlays.
- Thermal oxidation (heat stress) can affect the mechanical strength of an underlay.

Do you have a question?

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Email our Technical Team now:
technical@kingspaninsulation.co.nz

UPDATED PRODUCT RECOMMENDATIONS

From July 1st, 2025, the scope of use for Kingspan Thermakraft synthetic absorbent underlays is limited to use in lined buildings.

Sheds and standalone garages: Use a reinforced aluminium foil, such as Kingspan Thermakraft's Thermabar 344.

Industrial Warehouses: Use a synthetic foil (Thermabar 397), a reinforced aluminium foil (Thermabar 344), or an Insulated foil (AIR CELL Insuliner).

Lined Buildings: Choose from Kingspan Thermakraft's wide range of Covertek synthetic absorbent underlays.

From October 2024, Kingspan Thermakraft advised the market that applications, such as canopies, lean-to's, soffits and open-bay sheds are not warranted for an underlay.

Napier Boys' High School

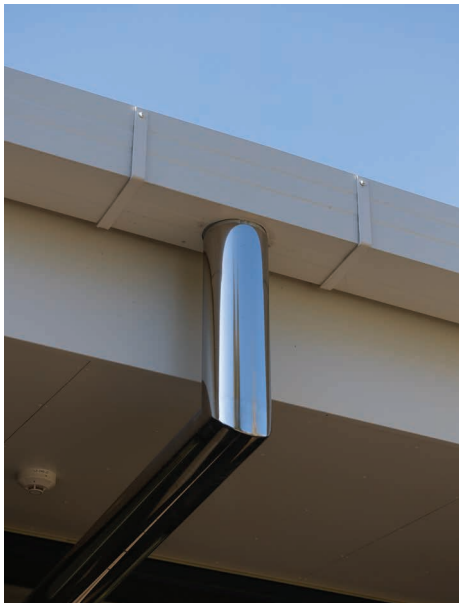
The new Science and English blocks at Napier Boys' High School provide teachers and students with modern classroom spaces, protected by AspireSpan® (PIR) insulated roof panels. Manufactured in New Zealand by Metalcraft Insulated Panels, these 25-metre panels offer superior thermal insulation and a continuous, watertight roofing solution.

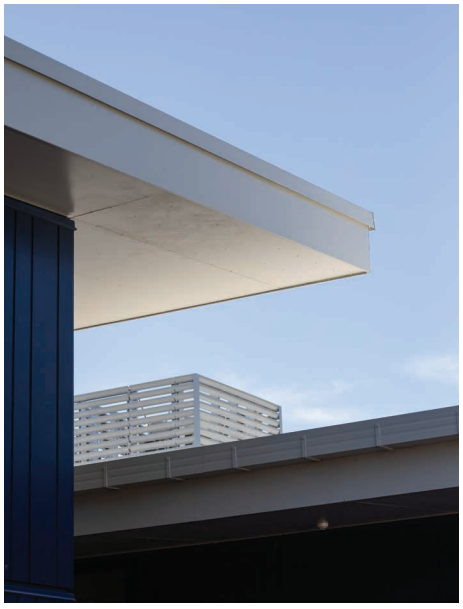
Designed by Stephenson & Turner and developed through extensive master planning with the school and the Ministry of Education, the buildings create modern learning environments for the Science and English departments. The English block frames the Quad with a veranda, allowing it to function as a year-round multipurpose space. An open corridor between the two buildings provides additional outdoor learning and a sheltered lunchtime space.

The Science block, facing the main field, features a rising mono-pitched roof that frames a full-length louvred screen. Inspired by DNA sequencing, this brise soleil (solar shading system) manages late-morning solar heat gain while providing a sheltered access corridor. AspireSpan® (PIR) panels extend across the roofline, capping the screen and defining an important elevation of the school towards Te Awa Avenue.

"The two blocks occupy one of the most important sites within the school," says project architect and Stephenson & Turner principal Richard George. "They border the sports fields and the Quad, anchoring key circulation routes while enabling passive surveillance for student safety."

With wide eaves offering protection from rain and Napier's intense sun, students now have comfortable spaces for both study and relaxation throughout the seasons. The Science block's façade has been carefully designed to create a sense of scale, appearing as a two-storey elevation to the fields. "This establishes a real presence, forming a strong architectural edge visible from the school's original heritage entry gate," adds Richard.





“We proposed AspireSpan for both cost and performance,” says Rich Hutchinson, director of roof installers Turfrey.

A warm roof for greater thermal efficiency

The architect specified a ‘warm roof’ using insulated PIR panels, where insulation runs continuously above the rafters. This eliminates the cold spots of a traditional roof assembly, preventing heat loss in winter and reducing unwanted solar gain in summer. Beyond improving thermal efficiency and reducing energy costs, the system is also significantly faster to install.

AspireSpan® panels feature a central PIR insulation core sandwiched between two sheets of COLORSTEEL®. With its interlocking slip joint, the roof was installed in half the time of a conventional system. Unlike insulation netting, the panel’s underside can be left exposed, providing a clean, finished internal surface.

A full-length roof

Typically, imported products are limited to about 11.8 metres – the length of a 40ft shipping container. AspireSpan®, however, is manufactured locally and can be ordered in lengths of up to 25 metres. For the Science and English blocks at Napier Boys’ High School, local manufacturer Metalcraft Insulated Panels supplied continuous 25-metre roofing panels from its Auckland factory.

“We proposed AspireSpan® for both cost and performance,” says Rich Hutchinson, director of roof installers Turfrey. “We’ve worked with Metalcraft products for over 10 years and understood what Napier Boys’ was aiming for. AspireSpan® delivers on aesthetics, longevity and helps reduce the building’s running costs.”

Rich’s personal connection to the school – his son was a student during the build – gave him an added interest in the project. As a school property inspector for the Ministry of Education, he had also contributed to the school’s 10-year property plan and advised on design issues. “I had a vested interest, both as a professional and as a parent,” he says.

Locally manufactured insulated panels for performance

One of the Ministry of Education’s key considerations was performance. “The roofing contractor, Turfrey, approached us to confirm that our product was suitable for the roof pitch and 25-metre span,” says Peter Zeeman, Manager at Metalcraft Insulated Panels.

"With imported panels, you're limited to what fits in a 40-foot container – about 11.8 metres," Terry explains. "If a panelled roof needs to be longer, with imported panels, you either have to end lap those panels or design a step in the roof. Metalcraft Insulated Panels' AspireSpan® can be manufactured in lengths of up to 25m, with transportation being the main constraint for sheet lengths."

For this project, producing 25-metre panels required careful planning, with storage space allocated and panels stacked in sets of four to suit on-site crane handling.

"Metalcraft Insulated Panels was fantastic – they sent one of their reps down to review the site and plan the delivery route," says Rich.

The logistics of moving long, insulated panels

Handling, storing and transporting panels of that length required detailed coordination. "We had a great deal of communication with Turfrey throughout the process, both pre- and post-delivery," says Terry. "The packs needed two forklifts to move them onto the trucks, and they were stored close to site overnight so they could be moved into place before school started."

"Metalcraft Insulated Panels was fantastic – they sent one of their reps down to review the site and plan the delivery route," says Rich. "The truck driver knew the plan when he arrived. Everything was organised for 4am to avoid traffic, allowing time for transport and craning onto the roof."

Installation proved straightforward. "Aligning the first sheets took some time using precision lasers, but once the first sheets were double-checked, the rest followed easily with an organised team," he adds.

Continuous roofing that meets every requirement

For architects, one of the key advantages of AspireSpan® is its ability to comply with or exceed the H1 Energy Efficiency requirements, with a thermal resistance rating of R3.5 for 75mm-thick panels. AspireSpan® is also available in other thicknesses and is suitable for use in all New Zealand climate zones. It is CodeMark-certified, confirming compliance with the New Zealand Building Code.

"One of the benefits of insulated panels is that thermal analysis is consistent from end to end," notes Richard. "We've got continuous insulation, so we don't have cold spots across purlins, which is hugely beneficial for energy efficiency."

For the students and teachers at Napier Boys' High School, the new Science and English blocks – with their off-white roofs, navy blue fibre-cement weatherboard cladding and dark bronze anodised windows – represent a step into the future. They offer high-quality learning environments where wellbeing is enhanced through comfortable indoor spaces and sheltered, multipurpose outdoor areas.

"We delivered something completely unexpected yet deeply informed by student and teacher feedback," says Richard. "And the response from the school, teachers, students and wider school whanau has been overwhelmingly positive."

About AspireSpan®

Metalcraft's AspireSpan® is a New Zealand-made insulated panel designed for walls and roofs, offering high thermal efficiency. Each panel features a polyisocyanurate (PIR) core between two layers of 0.59mm steel. Available in widths of 1000mm and lengths up to 25 metres, AspireSpan® provides excellent energy efficiency while reducing installation time with its interlocking slip joint.

With thickness options from 50mm to 150mm, AspireSpan® panels can be tailored to meet thermal and structural requirements, depending on the project's specific needs. AspireSpan® is CodeMark-certified, making it a durable and compliant solution for modern roofing construction. Its seamless installation and high thermal performance make it a solid choice for architects and builders seeking high-quality insulated roofing panel systems.

"We delivered something completely unexpected yet deeply informed by student and teacher feedback," says architect Richard George.

Napier Boy's High School

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CREDITS

Architect
Stephenson & Turner

Roofing Manufacturer
Metalcraft Insulated Panels

Roofer
Turfrey

Main Contractor
Stead Construction

Product
AspireSpan® with a Mesa profile to internal skin, in COLORSTEEL MAXX® Titania

Rainwater harvesting

We have previously published several articles in Scope on metal roofing and the collection and processing of sustainable and potable water. Back in Issue 25 in 2010, Graham Hepburn reviewed the importance of water and the sustainable process of harvesting drinking water from metal roofs. We republished a revised version of this in 2021 in light of the then-proposed "Three Waters" reforms (now abandoned).

The publication by the Water Services Authority (Taumata Arowai) of a new Acceptable Solution for Roof Water Supplies, which came into force on 14 November 2022, prompted a fresh look at this topic. As usual, following this AS implies compliance with the Standards.

These newly published documents suggest that this is again relevant, so we are now revisiting this topic.

Rainwater harvesting – of increasingly potential value today

Fifteen years after our original article, access to potable (and indeed any) water has become even more critical in a world in which water supply is becoming a serious issue. Even in rain-rich New Zealand, we are increasingly talking about control of water, water rationing, depletion of aquifers, and so on. At the same time, we are increasingly suffering from downpours (mostly uncaptured) and flooding, as shown in the Hawkes Bay catastrophe of 2023.

We are also examining the limitations on water supply for urban uses. Even during what was exceptionally heavy rain in 2024, the Auckland system, on which the city relies, had less than desirable levels of water at 63% of full against a historical average of 79% for this time of year (14% down). Storage trends are down consistently – as published by Watercare Services. Although a recent announcement proclaimed Watercare's Auckland dam levels had reached 100% capacity in August 2025.

There is actually a finite non-reducing amount of water (i.e. total water on the Earth) which is not, in fact, being consumed in the sense of disappearing. Depending on the source, only 3% of the 1.4 billion km3 of water is fresh, and of this, two-thirds, or 2%, is unavailable (locked up in icebergs or underground). This leaves a mere 14 million km3. But of this, "only" 13,000 km3 is in the atmosphere to become rain.

And, there appears in many places to be too little (or sometimes too much) of this water for at least some of the time. There is little doubt that water is one of the planet's most valuable commodities, and maintaining water supply will become even more critical as populations continue to increase, and increasing localised heat and dry spells compromise local water supplies. If the planet is going to be subjected to increasing extremes of flooding and drought, then security of a good quality water supply will also be increasingly important.

Let's look at New Zealand specifically, although much of this is relevant to other countries.

Potable water

In rural areas with no mains supply, the easiest source is to harvest rainwater from roofs and collect it in tanks, treated or untreated, and then pump it around the system. Many rural households prefer this source, as it's cheaper and easier than digging a well or pumping stream/river water. This does depend on using a suitable roofing material to collect clean rainwater.

Harvesting rainwater for uses other than drinking drastically cuts demand on the mains supply. It is estimated that only 5 litres per person per day is needed for cooking and drinking (potable). In comparison, 150 litres per day are used for bathing, washing dishes and clothes, in the garden, or for washing down cars, etc., and for flushing toilets, which is termed, respectively, grey and black water. If this demand can be reduced by using rainwater for non-potable purposes, a huge reduction in demand on the urban systems could result.

Access to potable (and indeed any) water has become even more critical in a world in which water supply is becoming a serious issue.

Of course, there is a limit to how far this can go without affecting the economics of urban water supply, and, for example, Watercare Services in Auckland prevents (or attempts to avoid) the collection of roof water for any purpose. In addition, the current Drinking Water Standards New Zealand (DWSNZ) does not allow the use of rainwater for potable uses where there is a potable mains supply available. (Of course, this doesn't affect non-potable use, which does require dual systems.)

Metering and charging for water use is a form of demand management, which is particularly important in today's world, where everything has its price. The metered amount of supplied water is usually used to determine the charges for wastewater treatment, as well as for the incoming mains water.

The traditional cost of treating water and the corresponding wastewater treatment, when done well, is approximately NZ$12/m3 (USD$6/m3). In NZ, we charge on average less than 10% of the true cost.

Recent NZ legislation is making it simpler for small rural communities/campsites and the like to comply with NZDWS (drinking water standards) with the introduction of an Acceptable Solution for Roof Water Drinking Supplies.

The trend to water collection is partly due to greater environmental awareness, but also to the fact that charges for water increase year on year. Some councils have also been encouraging homeowners and businesses – sometimes with financial incentives – to collect rainwater for non-potable purposes because this has twin advantages: it helps to reduce stormwater flows into the system by holding it on site, and it alleviates some of the pressure on water supply and water infrastructure from a growing population.

The Acceptable Solution (AS) referred to deals with how to use roof-gathered water for one or several buildings serving a number of people (i.e., not restricted to single dwellings). If the collection serves more than one dwelling, it must then comply with the standards. The AS allows this without the undue compliance costs that generally come with a water supply authority provision.

The trend to water collection is partly due to greater environmental awareness, but also to the fact that charges for water increase year on year.

In New Zealand, each local authority has the responsibility for funding all water and waste infrastructure. This has become increasingly difficult with tightening regulatory environments both on potable water standards and wastewater discharges. If the true cost of maintaining infrastructure were levied on ratepayers, councillors would lose elections. Therefore, over decades, the investment in water and wastewater infrastructure has been way less than necessary in regional New Zealand (and some urban areas).

As we have not invested in adequate new infrastructure, one good way to limit cost is to limit demand, and rainwater harvesting is a cost-effective mechanism to achieve this.

The new AS provides for broader use of rainwater for potable and non-potable storage and provides design requirements to be met – for example, processing and storage tank materials. The cost of providing safe, quality water to small communities in rural New Zealand without funding changes is becoming prohibitive. Indeed, without change providing for either central government funding or area-wide rate base funding, many small communities will be unable to afford to comply with DWSNZ. Therefore, we can't help but think that changes in the DWSNZ, allowing for rainwater to be used as a potable source in smaller communities, should be an option.

What rural dwellers already know is that it is quite possible to collect and store all the water needed for living (usually), and to process grey and black water onsite – often at a lower cost than fully provided urban services in semi-rural areas.

It is actually environmentally neutral – all the rainwater that falls on the building is returned to the ground in some way (depending on the wastewater processing method).

Although drinking water is the smallest component of water used, currently all water must meet the DWSNZ, which means the roof must provide clean, uncontaminated water. The best roofing material for minimising the risks of contaminants is long-run metal roofing, painted or unpainted. Key aspects of the AS, which concludes long-run metal-coated roofing is the best option for roof material, include that the following contaminants must be monitored and be within the limits:

- Benzo[a]pyrene < 50% MAV = 0.35ppb
- Cadmium < 50%MAV = 2ppb
- Copper < 50%MAV = 1ppm
- Lead < 50%MAV = 5ppb
- Zinc < 50%MAV = 750ppb

Long-run metal roofing meets these requirements easily and reduces the propensity for lichen and the like to form in unwashed areas of the roof.

Reducing demand

Collection and storage of water also helps to conserve this valuable resource and will reduce the need for councils to build more dams or find other water sources. If you are providing your own water, then that also cuts demands on treatment facilities and pumping stations, which in turn means they will need to consume less energy. The individual owner of the storage, therefore, also uses less water, and those with metered connections will reduce their water costs.

As New Zealanders have known for decades, catching water off a metal roof for drinking and other household uses is cheap, easy and safe, as long as some basic precautions are taken.

Safety of roof water

The roof and gutters need to be cleaned regularly, with diverters in place to make sure contaminants, such as bird droppings, that are being washed away aren't entering the water supply. Treating roof water to potable level can be as simple as coarse filtering incoming flow, finer filtering, and UV treatment before pumping to the house (see the illustration). The AS and the Drinking Water Quality Assurance Rules 2022 provide extensive information on cleaning roof-collected water. Complying with the AS will provide clean water.

Stormwater and flooding mitigation

In urban environments with their proliferation of impermeable surfaces, stormwater during heavy downpours can and does cause surface flooding and overwhelm sewers. Where there is a cross-connection between stormwater drains and sewers, as there still is in Auckland, this is worse and more frequent, causing foul-water discharge into waterways.

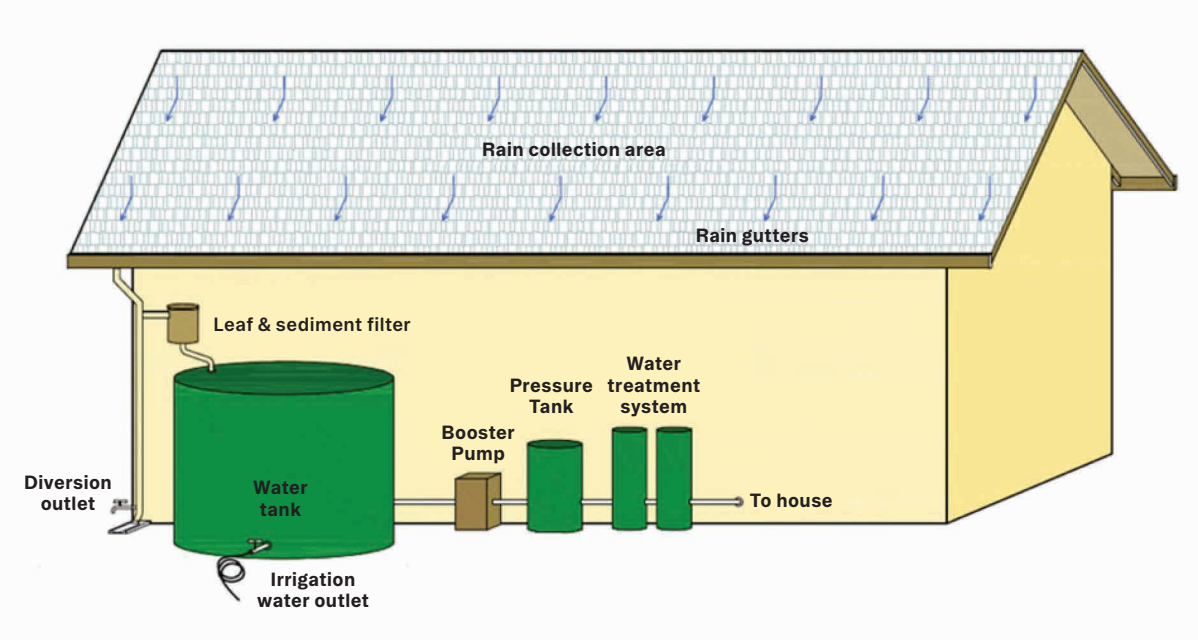
As climate change continues, we will see increasingly irregular but heavy rainfall, which will exacerbate this problem.

Collecting water off roofs reduces stormwater problems by attenuating the flood peak, conserving a valuable resource, and reducing the need for councils to build more dams or find other water sources. If you are providing your own water, then that also cuts demands on treatment facilities and pumping stations, which in turn means they will need to consume less energy.

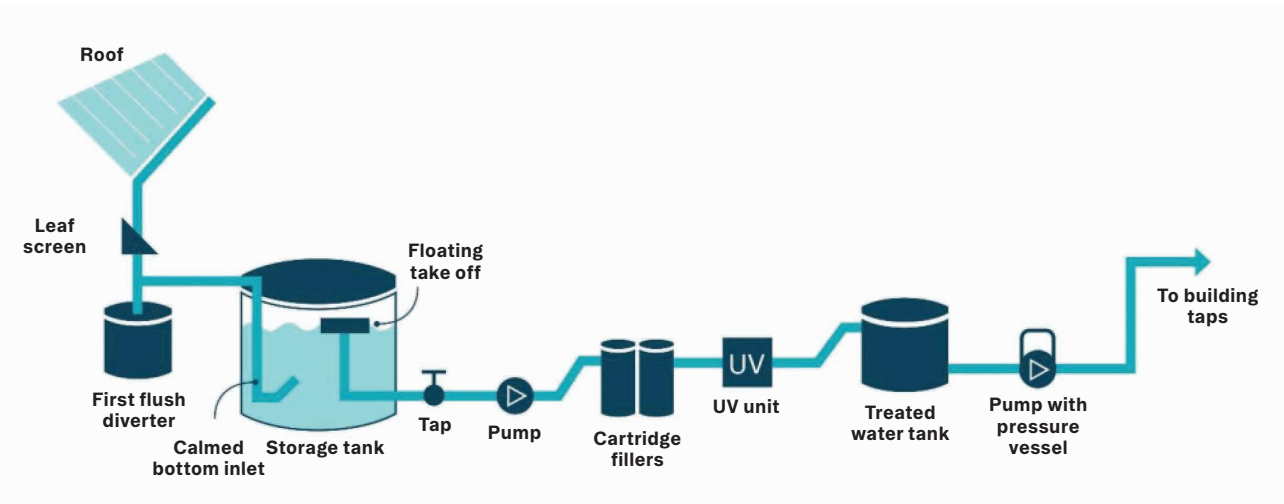
Sustainability

After several revisions, the 2022 Homestar Version 5 was issued by the NZ Green Building Council. This provides credits for using metal roofing to gather rainwater for much the same reasons as listed above.

Typical basic rainwater collection system



From the draft Acceptable Solution. Note: separate tank for treated water



CREDITS PARTICULARLY RELEVANT TO WATER COLLECTION ARE:

EF3 - To encourage and recognise water conservation through water-efficient fittings and rainwater harvesting.

EN3 – To encourage and recognise specification and use of responsibly sourced materials that have lower environmental impacts over their lifetime.

EN5 - Site water and ecology - to encourage a whole-of-site approach that improves the ecological value of the site while reducing stormwater runoff, flooding, pollution and erosion.

And while not related exclusively to rainwater processing, points for metal roofing can also be gained for: EN4 - Construction waste - to encourage and recognise effective strategies that reduce the environmental impact of construction waste.

Overall

Homeowners collecting drinking water and greywater replacement from metal roofs can do so knowing they are – without risk – harvesting a renewable resource which can also help with urban supply and stormwater flooding mitigation.

Metal is the roofing option that is the best-suited material for rainwater collection, and this is recognised by the NZGBC Homestar rating system and by the Acceptable Solution.

Rocky Ridge House

At the gateway to one of New Zealand's natural wonders, where Fiordland National Park meets Milford Sound, is a home that connects strongly with its location – the rocky ridge on Te Anau's outskirts. This home stands as a testament to how collaboration, sustainability, and impeccable design can come together to create a space that can be enjoyed for generations.

In 2022, two Te Anau-based homeowners had completed a bach and were enjoying the experience of having a warm, purpose-built and comfortable space to live in. Their primary home was old and no longer up to scratch, lacking adequate shelter from the extreme climate and cold of Southland.

Seeking to create a new permanent residence, they reached out to Fabric, the architectural practice behind the bach they were enjoying as a temporary home. Fabric, an award-winning Christchurch architecture practice led by registered architect Mitchell Coll, prides itself on creating spaces that not only feel right for its clients but also connect them to the surrounding environment, designing buildings that seem as though they've always been there.

Knowing their clients had lived in Te Anau for a long time, Fabric understood the importance of creating a place that enhanced everyday living by providing comfort and a strong connection to the local environment. Thus, the story of the Rocky Ridge home began.

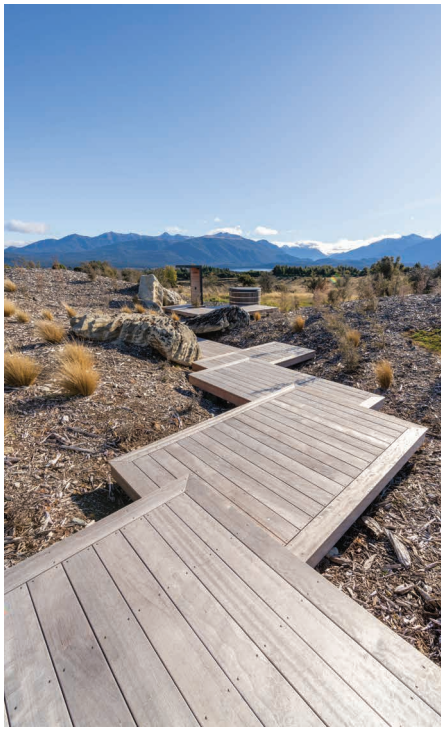
Mitchell says, “With clients who understood that this should be more than a house with great views, we set out to create a deeper sense of place with two key thoughts. Their home should blend with the surrounding landscape and be part of the rocky ridge it sits on. And, having spent most of their lives in the area, it should feel familiar, despite being brand new.”

Te Anau’s extreme climate presented significant challenges, necessitating high thermal performance to ensure year-round comfort, while also maximising the impressive views the surrounding landscape had to offer. Mitchell adds, “Being in an extreme climate, high thermal performance was of top priority. The challenge with this house was the panoramic view directly to the west, giving the potential for overheating from the sun.”

Fabric rose to the challenge by devising a design that would prevent overheating from the west. It opted for a narrow cross-section, allowing efficient airflow and incorporating high, operable windows to release heat. Thermal modelling ensures the right balance of sunlight, heat retention and natural cooling. To enhance the home’s interior comfort and ensure efficient operation, the design includes high-performance detailing such as a solar-powered, in-floor hydronic heating system and a fully insulated concrete floor. The main living space and bedroom suite are situated around a central wood fire, with slats between the living and bedroom allowing for easy communication and an even temperature between rooms. Large areas of glazing were strategically positioned to maximise views without compromising the home’s thermal performance.

A roof plays a critical role, both in the aesthetic appeal of a home and in its thermal performance. Choosing the right roof underlay and pitch significantly impacts a home’s thermal efficiency by influencing ventilation, preventing moisture build-up, and allowing for proper insulation placement. This assists in reducing heat gain in summer and heat loss in winter, leading to improved energy efficiency and comfort levels within the home.

Attention to detail, knowledge, and experience in installing roofs to the required standard in such a vast and extreme environment were crucial when choosing a sub-contractor for Fabric’s clients’ home. The roofing installer chosen was Cory McDowall, from McDowall Roofing Limited.



Te Anau's extreme climate presented significant challenges, necessitating high thermal performance to ensure year-round comfort, while also maximising the impressive views.

Dimond® Roofing was McDowall Roofing's roll former of choice, and 430 linear metres of Corrugate was ordered. As the "No. 8 wire" of roofing profiles in New Zealand, Corrugate offers versatility in design and function. This profile also pays homage to the rich history of corrugated iron used throughout New Zealand and its versatility for both roofing and wall cladding applications.

To further enhance the roof's performance and for added protection against the elements, the roofing system incorporated ColorCote®'s ZinaCore® substrate and MagnaFlow™ flashings. ColorCote's ZinaCore is renowned for its durability and long-lasting performance, offering superior protection from corrosion and weathering. By opting for MagnaFlow flashings, the homeowners ensured an added layer of defence against the harsh climate, giving the roof an extra boost of protection and longevity.

The roof's colour, Ironsand – a deep brown charcoal – supplied by Dimond Roofing, adds a subtle yet seamless contrast to the home's soft-toned cedar and birch plywood exterior. This accentuation not only enhances the home's form but also provides visual interest up close and a more easily understood silhouette from afar. Careful terraforming and re-naturalisation ensure this home and its surrounding structures are part of the landscape.

Now that this home is completed, its ridge-like form sits comfortably in the landscape. Fabric is a prime example of how collaboration, sustainability and impeccable design can come together in architecture and be brought to life through the meticulous craftsmanship of Te Anau Homes Ltd and sub-contractors such as McDowall Roofing Ltd.

P

Rocky Ridge House

CREDITS

Architect
Fabric

Rollformer
Dimond® Roofing

Roofing Installer
McDowall Roofing Limited

Builder
Te Anau Homes Limited

Pre-coated Steel Supplier
ColorCote® ZinaCore®

Colour
Ironsand

Queenstown A-Frame House

A homeowner's appreciation of the classic A-frame style was the inspiration behind a recent renovation in the Queenstown Lakes area – and played a pivotal role in the design.

A collaboration between Robbie Dick of The Habitat Design Co., Southern Projects' Mark, and Velvin Buildings' Joe, right from the design stage, allowed for a holistic assessment of various design decisions.

The clients' vision to retain the character of the house led to keeping the existing A-frame structure despite initial considerations for a complete demo and rebuild. "The clients were great to work with and had a clear vision for what they were trying to achieve. They loved the classic A-frame style and wanted to retain the character of the house. We explored options to demo and rebuild, but kept coming back to the existing A-frame," says Robbie.

Robbie says, "We had a really good team involved for this project. From the design stage, I worked with Mark, the QS/project manager, and Joe, the builder from Velvin Buildings. This helped with assessing the pros and cons of various design decisions early on in the process."

The renovation presented its own set of challenges, especially with a house built in the 70s. Major structural modifications required structural engineering solutions.

The renovation presented its own set of challenges, especially with a house built in the 70s.

Robbie explains: “Carrying out major renovations to a house built in the 70s was always going to be a challenge. We opened up the living area and added dormers, which required engineering solutions to support the structure. We had to work within the restraints of the sloping A-frame roof, which made maintaining head clearance for access routes and stairs a challenge (especially with limited plans on council files).

“We added a skylight above the spiral staircase to mitigate this, as well as carrying out many site measures. Adding the bedrooms and garage to the ground floor involved working with the existing subfloor and ground levels. During construction, the existing asbestos tile roof had to be removed before any new building work could begin.”

Among the standout features of this project is the spiral staircase, installed with remarkable precision. “The spiral staircase is an impressive feature of the house. We worked closely with a company in Auckland to get it perfect. When it was installed on site, it was craned in between the rafters with just millimetres of clearance,” says Robbie.

The beech tongue-and-groove wall and ceiling linings exemplify the exceptional craftsmanship of the builders.

Steel roofing was chosen for its low maintenance and aesthetic appeal, and ColorCote® became the best option.

Robbie says, “When choosing a roofing product, we wanted cladding that was low maintenance and aesthetically appealing. ColorCote pre-painted steel was the ideal solution.” ColorCote ZinaCore® was used for this project and supplied to Dimond Roofing, who roll-formed a total of 244.91 linear metres of Dimond LT7 in the colour Ironsand.

“We explored using Tray metal roofing; however, the clients preferred a product that didn’t make the house look too modern. After looking at a number of different profiles, we decided on the LT7 profile, which looks great,” says Robbie. The LT7 profile from Dimond Roofing was specifically chosen to avoid a too-modern appearance, adding to the project’s distinctiveness.

“When choosing a roofing product, we wanted cladding that was low maintenance and aesthetically appealing.”

The Habitat Design Co., helmed by founder Robbie, along with teammates Lisandra and Ben, has been creating architectural statements since its inception. Robbie says, “I formed the company back in 2015, and we mainly work on residential new builds and alterations in the Queenstown Lakes area. There are currently three of us in the team, including myself, Lisandra and Ben.” This tight-knit team brings a unique blend of creativity and precision to its projects.

Collaboration and clear communication are strong points for both The Habitat Design Co. and Velvin Building, and the two companies have worked across numerous projects together.

“We’ve collaborated with Velvin Building on a number of projects, and Joe and his team are always great to work with. The recognition and awards they have received for this project are thoroughly deserved,” Robbie says. These awards, including the Southern Supreme

Renovation of the Year, Pink Batts Craftsmanship Award, Builders Academy Renovation in the $1 million - $2 million Category, and a Gold Award, attest to the dedication and excellence of Joe and his team.

This project showcases outstanding craftsmanship, thoughtful design and the use of materials that will stand the test of time. From the raw exposed-steel beams and portal frames to the warm tones of Southland beech, the harmonious blend of old and new materials adds a timeless character to the house.

As Robbie says, “This creative renovation has transformed a derelict A-frame into an iconic and enduring family home.”

P

Queenstown A-Frame Home

CREDITS

Architect
The Habitat Design Co.

Rollformer
ColorCote®

Builder
Velvin Building

Roofing Supplier
Dimond® Roofing

Profile
Dimond® Roofing’s LT7

Substrate
ColorCote® ZinaCore®

Colour
Ironsand

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