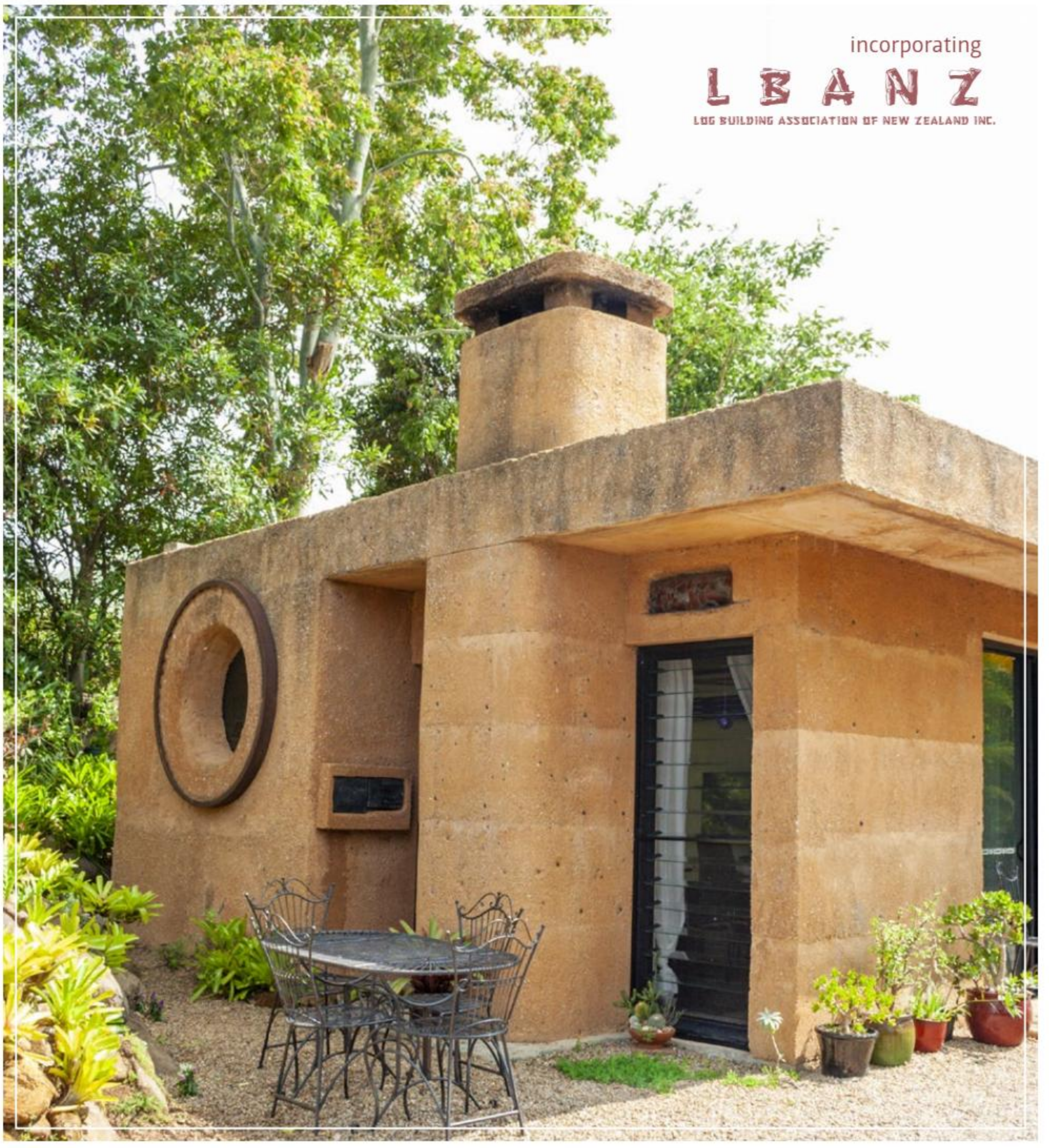
# THE Owner Builder

BE INSPIRED – REAL STORIES ABOUT REAL OWNER BUILDERS

**217** ♦ MARCH-MAY 2020 ♦ AUTUMN 2020 **$12.50**



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**POURED EARTH ♦ KIT HOME ♦ RAMMED EARTH ♦ TINY HOME ♦ SHED HOUSE**

# In house...

*'Be kind whenever possible. It is always possible. Always.'*
*'Tragedy should be utilised as a source of strength.'*
Dalai Lama

What a start to the year! Even politics and religion have been overshadowed by the unprecedented bushfire season activity. While I know it is coming each year, I'm really not sure if I am ever fully prepared. I am fortunate to have not been directly affected by any of the fires, and like many I was shocked at the pure ferocity of the onslaught. Unsurprisingly the entire tragedy was used by all manner of people and parties for furthering their own agenda, but the most tragic to me were the arsonists and the looters. Here, at ground level, the most basic instincts of humans seems to have gone terribly awry.

Architects and designers and stepped up, with 'bushfire proof' house designs being made freely available. I have shared a few of these through ***The Owner Builder*** Facebook page. Some of the comments about these designs have been downright bizarre! We don't all like the same style of building – thank heavens, I say – but the negativity really put a damper on the gift of sharing.

And so the words of the Dalai Lama jumped out at me; be kind, always. Even, or especially, online.

In the aftermath, many are now having to rebuild their lives and their homes. I have been in touch with a few readers who have lost everything. I can't even begin to imagine how they are feeling. Some are determined to build again, others have decided it is just too painful to contemplate. The question of how much the cost of rebuilding will increase, now that new codes need to be adhered to, is a cause of concern for many. A salient reminder to update insurance values on a regular basis, on a new-for-old basis, including the need to upgrade to meet stricter building regulations.

The Clean Energy Finance Corporation (CEFC) has announced a new green home loan to spearhead the construction of market leading, energy efficient housing. Rock-bottom interest rates from 2.44 percent are on offer if you build or buy a home with a minimum 7-star energy rating. While this may be incentive for some change, I am sceptical it will make all that much difference; I've seen houses built to 6-star but achieved through 'fudging' the system by installing solar panels so that an airconditioner and swimming pool are offset, while ignoring the basic energy efficient principles of design and material selection. But it is at least a step in the right direction, and I am a great believer in the idea that every little change can help towards the bigger goal. It will also probably not be available to owner builders, but I hope to be proved wrong on that point.

Jam packed full of great owner builder inspiration, this issue once again includes a collaboration – this time, with the Log Building Association of New Zealand. It has been a pleasure to work on this content with Marian Ganzeveld, the editor of their membership magazine *No Problem!* We both hope that you enjoy the possibilities offered by exploring building with logs.

Hi – I'm Lynda, the publisher, editor and designer of ***The Owner Builder*** magazine. Creativity and originality are just some of the attributes that I admire greatly and strive for constantly. I value the opportunity of sharing the wonderful diversity of homes that are created by owner builders – everything from natural earth, straw, timber and stone to engineered materials and shipping containers is inspiring.

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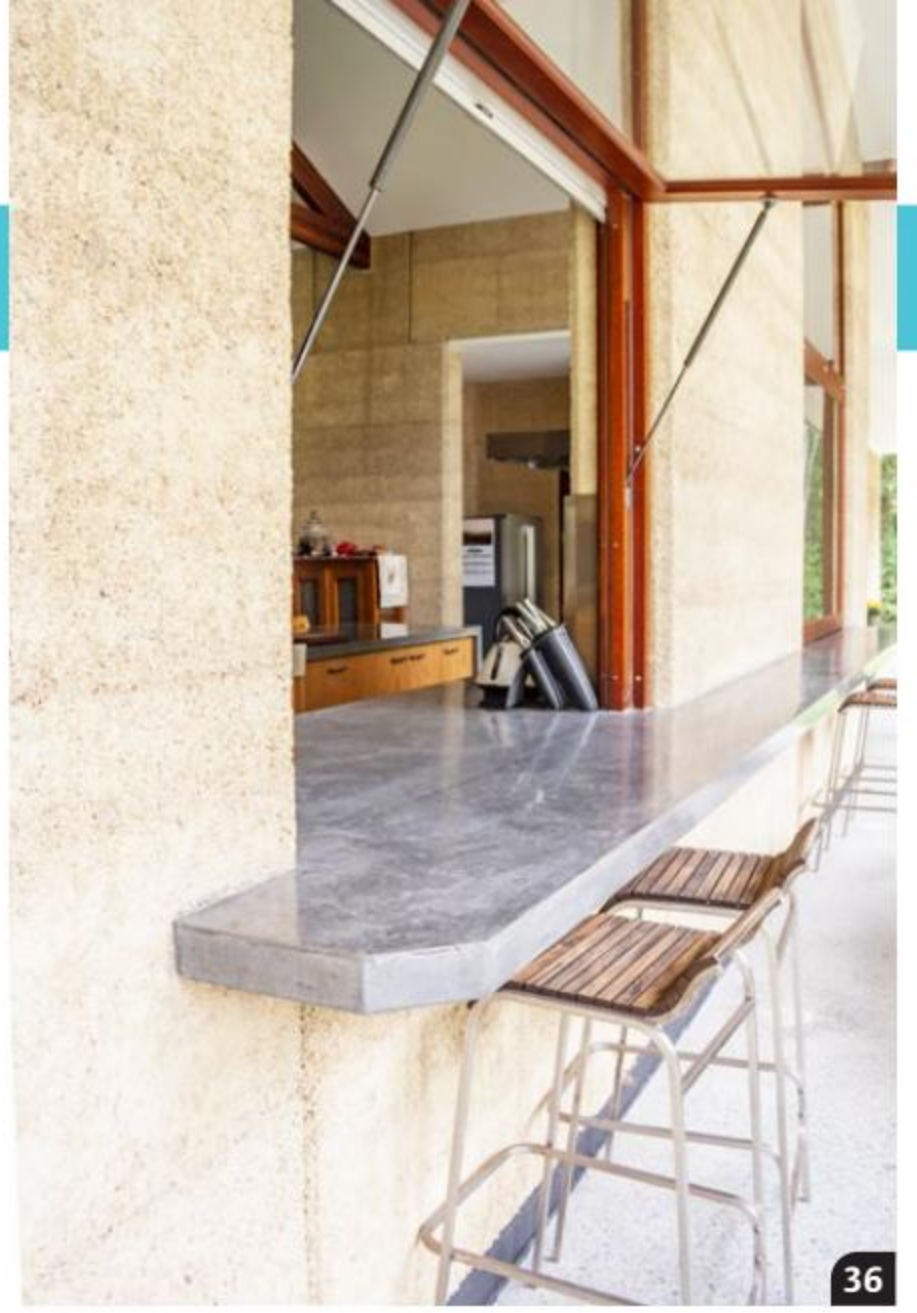


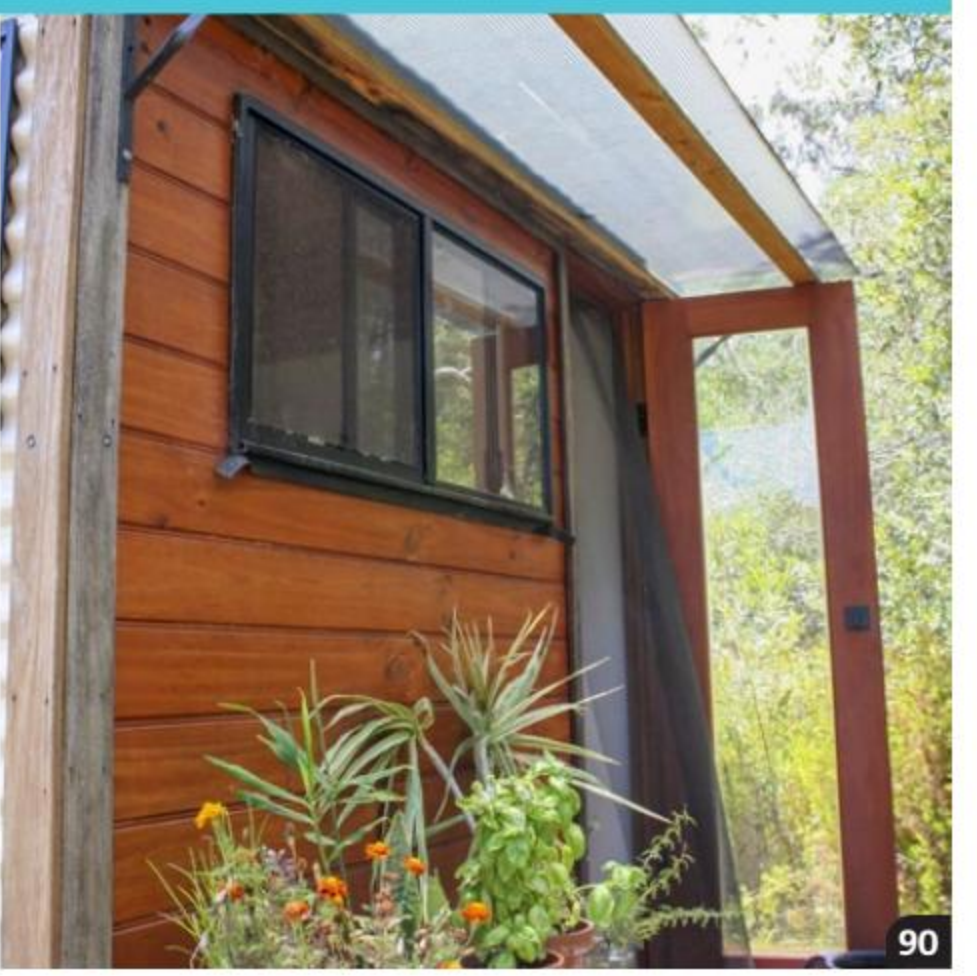



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# Our details...

*The Owner Builder* is an independently published magazine – the first issue came out in 1981 – and it has been informing and inspiring owner builders ever since. While it has changed in appearance over that time, it still remains true to its origins – to produce a unique publication that is of value to those who choose to be involved in creating their own shelter and to share and celebrate their creativity and hard work.

## CONTACT


**Email:** info@theownerbuilder.com.au

**Web:** www.theownerbuilder.com.au

**Post:** PO Box 64, Stockton NSW 2295, AUSTRALIA


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## FRONT COVER

This massive monolith of poured earth is both practical and beautiful, nestled into its suburban location, responding to the harsh Australian climate. *Story starts page 8.*

## WHO's WHO


**PUBLISHER ♦ EDITOR ♦ DESIGNER**
Lynda Brighton

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## DISCLAIMER

*We thoroughly support the continued sharing of ideas amongst owner builders. However, you should be aware that any particular solution may not suit your situation or even be tolerated by your council. Always be aware of on-site safety; just because a photograph shows someone performing a task one way does not necessarily mean that it is safe or suggested best practice.*

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## DEADLINES:

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**Editorial**: 7 April 2020
**Advertising**: 7 April 2020

**219 Sep-Nov 2020**
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**Advertising**: 7 July 2020


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# Modern monolithic

*Bringing poured earth building into the 21st century*

**BY LYNDA BRIGHTON**

I always pick up local publications wherever I travel; I find them a great way of getting a good feel for a place. I was intrigued by Paradiso magazine, discovered while passing through Federal in the Byron Shire NSW. I put it aside for a few days before having a proper look. And there was this amazing poured earth home, with curved edges and circular windows; I just had to visit it! More than a year later, I finally managed to connect with owner builders Pete and Tina.

Pete and Tina were living next door in a circa 1928 Queenslander which they had relocated, renovated, and sold before designing and building with poured earth. While the incredibly high maintenance of the Queenslander was an issue they wished to remedy, they also felt the need to create something that would address the housing affordability issue. Poured earth seemed to be the perfect solution and so it has proved to be. The new block has given rise to two modern monolithic buildings that are both beautiful and practical, responding to the harsh Australian climate.

Pete believes that because they are such extremely durable structures, they would be ideally suited to handle the fires that have been ravaging the Australian landscape this summer. The home nestles into the suburb well; to me it looked as if it had been there for decades, nicely weathered and softened to blend with the eucalypts. But no, it is only three years old, and it is not finished yet. Beck Marshall, author of the article in Paradiso, described it as 'full of curves and grace'.

Not surprisingly, what started out as a construction project has morphed into a 'living artwork'; in fact, Pete has started painting the most incredible abstracts as a result of his dabbling with painting the floors. But more of that later...

## Learning 'how'

The curved wall edges had me questioning Pete about the difficulty of the formwork involved. In typical owner builder style, he replied 'no, it is easy once you know how, most things usually work out first shot for me'. And that is what this whole build has been about – learning 'how'. It has been a huge experiment with poured earth mixes and methods, as well as internal finishes.

The walls are just the start of the quirks and uniqueness of this build. Two circular windows, surrounded by metal rings salvaged from a film set, along with embedded bottles, low relief carvings, mosaics and marbles all add a touch of the avant-garde. In the morning, the mosaiced glass tubes in the external eastern wall spreads a cranberry coloured light through the building.

The mix used is similar to rammed earth, with about 10% cement, local crushed rock from the Pottsville quarry and soil dug up on site from the footings. Once the formwork was removed, the walls were wire brushed while still green, to reveal the beautiful stones; these give the walls character while helping to soften sound reverberation, which is often a problem with dense hard surfaces.

The chimney, also with rounded edges, was an afterthought. Originally the solid fuel fireplace was to be located within the main space but the idea came to build a special chimney space for it. Organic architecture at its best...

## Massive roof

The roof is a poured concrete slab, thereby forming an impregnable sealed monolithic structure, with the only entry points those that have been designed in, such as windows and doors. The original design was for rooftop water gardens but since the massive bushfires, Pete and Tina have decided that growing food should be a priority. The gardens will further aid in insulating the building, as well as providing additional fire protection. Pete is hoping to liaise with CSIRO on determining the suitability of the construction method for bushfire prone areas.

These buildings in Bangalow are examples of non-loadbearing, as there are three steel posts embedded in the walls to the north and a concrete reinforced block wall to the south, taking the load of the roof slab. However, in another build, Pete, acting as a consultant in conjunction with engineer Bill Payne of Ardill Payne & Partners, has been able to achieve loadbearing walls that substantially reduce building costs while increasing the building's strength exponentially.

The stairs to the rooftop are yet another great example of reuse and experimentation. 32mm reinforcing bar from the tip shop, already having a 90 degree bend, was cantilevered into the walls, with pebbly concrete treads formed in place. Separate buildings, a granny flat and main dwelling, will give a very generous 140m$^2$ of rooftop garden.

Looking up, the honeycomb-patterned ceiling is yet another unusual and striking feature. In the first building, Pete hand cut these Australian hardwood formply shapes with a jigsaw, so each hexagon is lightly different, making piecing the ceiling together neatly a time-consuming job; in the second building, he had the ply panels cut with a CNC machine. Glued in place to the formwork that was left in place after the concrete roof slab was poured, there is a narrow shadow line between panels, with the background first painted black as well as the edges of each panel.

The formwork is another example of reuse; it was first used to build the walls, then reused to form the roof slab and finally left in place as the ceiling, albeit covered with decorative ply panels.

## Everyday art

The painting of the concrete slab floors is something Pete loves doing, and he has even redone some sections. Using standard artist acrylics, sealed with a low VOC clear coat from *Ecolour*, these are basically artist canvases. And this is where his latent painting talent was sparked; Pete, painting under his alias nickname Waves, has since completed more than 150 canvases, is featured in local art galleries and has progressed to working on enormous pieces using recycled canvas truck tarps.

In the 2-bedroom, 1-bathroom main dwelling, the bathroom cum laundry floor will be screeded and painted. The walls are clad with formply and will be sealed with the same *Ecolour* clear coat used on the floors. Internal walls are cement board and the ceilings (other than the ply ones) are *Aquachek*, a moisture resistant plasterboard. The river pebble floor in the granny flat bathroom was laid by hand, 'never again,' said Pete.

The bamboo-look in the shower area was created by mistake, when Pete was spray painting some metal pieces on a scrap sheet of ply and noticed the overspray pattern when finished. The vanity top is also formed concrete; in this case Pete used a raw section of ply and it has left a subtle print of timber grain in the surface. Concrete plinths will be topped with off the shelf swimming pool glass panels as a shower surround.

There are a number of other steel rings of various sizes that will be used to create a feature sculpture around the potted gingko tree, softening the square edges of the courtyard.

## Practical pointers

The kitchen cabinets sit on a formed concrete ledge, with the space to be filled with concrete so as to avoid any spaces that could harbour insects or vermin. The concrete benchtops were made in formwork on the ground and then put in place. The side against the smooth formwork is the top of the benchtop and will not require any further polishing. Concrete tops will be coated with several coats of clear coat, also from *Ecolour*.

Both bedrooms have a small loft area, accessed by ladder; the main bedroom loft is small and is only used for storage, while the second bedroom/study has a larger loft with crawl space that will be a perfect sleeping spot for younger, agile visitors.

The bedhead in the main bedroom is lead lined, as a barrier against the electrical field from all the power cords

that run through that wall. The massive poured earth walls themselves provide some barrier from radiation, evidenced by the poor mobile reception once inside.

## Natural air conditioning

And then there is the waterfall... framed by large sliding doors, this water feature is both beautiful and practical. The structure was built up over time using leftover concrete from various stages of the build. Planted out and with water circulated via an underground 3000-litre tank, the result is pure tranquillity when viewed from the living room. It also acts as a natural air conditioner, cooling the air as it passes over the water. The main dwelling will also feature a waterfall, based around a number of watertanks.

The internal wall doesn't quite reach the ceiling and has a grilled space below; this allows for continuous air movement. Single glazed aluminium framed windows and louvres have been used, except for the circular windows that feature a fixed pane inside a timber frame on the internal face of the wall.

Performance has been great both summer and winter. The windows and doors are opened to allow the cooling breezes through, and are positioned so as to optimise this.

## Sculpting outdoors

Pete's creative spirit is not restricted to the buildings; the lush gardens are continually being improved, even spilling out into the public access easement alongside. There are some glorious gargoyles keeping guard; they are rejects from a local factory where Pete used to work. The enormous bird bath was made with the same mix as the walls, with some tea tree mulch (plentiful local product) added to make the mix lighter.

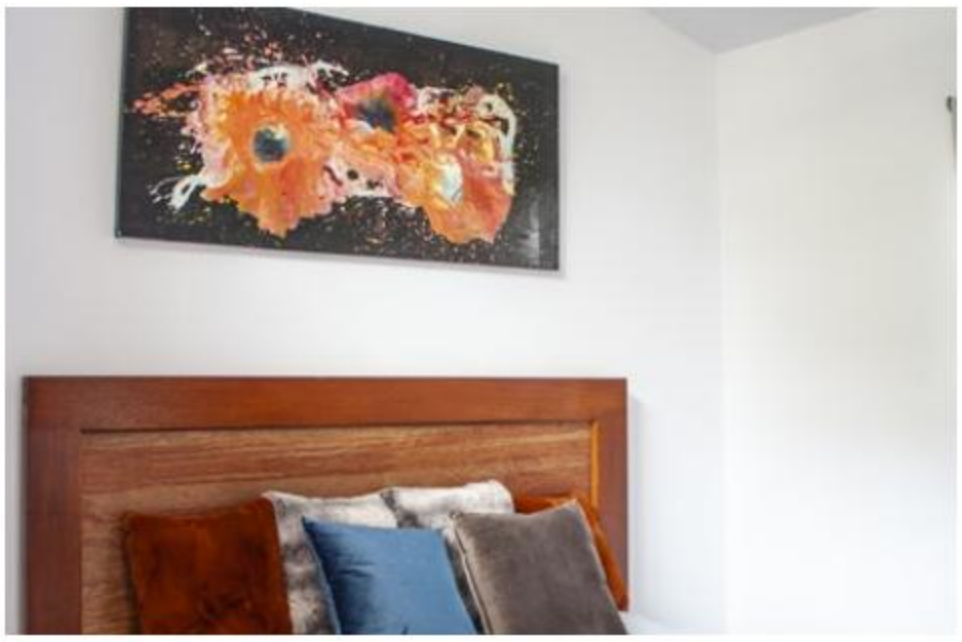
With the number of watertanks required, Pete came up with the ingenious idea of wrapping them loosely in old tennis court netting, creating planting pockets and then rendering the whole thing. The result is 'a rock wall', providing yet more growing space while camouflaging the tanks. A set of repurposed agricultural irrigation tanks provides further water storage, concealed inside the front wall.

## Sharing information

Trying to research poured earth techniques, Pete realised there is very limited information available. Poured earth is not a new thing, as it was used and venerated in several areas of Australia in the early 1980s, where he learnt the basic technique. Having the experience and expanded knowledge gained from several successful builds, Pete has set about working on a book documenting every stage of the process, including the various experiments. The book is near completion and Pete has begun searching for a publisher.

He is also preparing a series of workshop builds that will hopefully see the construction of several homes, while training those who wish to learn his poured earth method. Employing a low tech approach wherever possible reduces build costs and requires less expertise. A shovel, cement mixer, wheelbarrow and a form is really all you need to get going. He laughingly calls this 'The One Shovel Revolution', and hopes that he can contribute to a more sustainable future for all.

Pete would like to thank Byron Shire Council for being so helpful and supportive with the builds and hopes that other councils can emulate their broad-minded approach. ◆



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# Mankato

*Modern construction with a rustic rural look*

**BY DIRK KLYNSMITH**

*We knew, from the very moment we saw the block, we knew.*

This is our second crack at our final place of residence and it is our tree change. Moving from first, Brisbane then The Gold Coast, we found 1.4 hectares (3.5 acres for those who are old school) of prime land on the gentle rolling hills of Beechmont in Queensland. The block has two stands of rainforest trees including such gems as brown pine, Bennett's ash, box ash, red cedar, tulipwood and black apple. The property name Mankato is from the American Indian word Mahkato meaning greenish-blue earth.

The block is split into two by a dam that runs full width meaning access is via a shared drive with our neighbour. With the block facing north-south and on a gentle hill it was fait accompli where the house site was going to go; facing north down a valley with a permanent running creek, grazing pasture and a heavily wooded section. Beechmont is part of the Scenic Rim Council; it is ideal for our purposes, being only 10km to Lamington National Park and in the Hinterland behind the Gold Coast. We are at 600m elevation and, while it gets hot, it is roughly 7 degrees cooler than Nerang at the base of the mountain.

## Rustic rural

Our concept was for a modern looking house built with conventional materials mixed with an assortment of recycled

timbers inside and outside. We wanted a rustic rural look in the house as well as the block and garden, that would run hand in hand with modern living without having to pay a fortune. Eventually we would be looking at using the property to run a B&B and hosting weddings and parties. An existing building built into a bank by the previous owner, which I have nick named *The Bunker* will become an entertainment area and possible studio.

We designed an open house with three wings connected by a large corridor. Set on a concrete slab, the 171m$^2$ house has two bedrooms, two bathrooms, laundry, secondary lounge, office (where I would run my photography business from) and in the main living area a lounge, kitchen and dining room. Each bedroom wing is separated from the living area by a breezeway. Crucial to our design, the back of the house in its entirety is walled by glass sliding doors to give each and every room a view of the valley and access to outside. The house faces north-south to take in the view, and the aspect would help to keep the house cool in late afternoon sun. To complete the look, seven recycled timber posts would hold up the verandah roof.

## Steel framed kit

The house was to be steel framed as termites are a prevalent problem in the area. To enable me to build the house we took our design to Imagine Kit Homes, who turned our concept drawings into architectural plans and the required engineering. They would be providing absolutely everything to build the house – frame, roofing material, cladding, plasterboard, sarking, screws and plastering. The house kit would cost us $101,000.00 delivered, which we considered excellent value. All we had to do was provide the labour and painting as well as trades like plumbing and electrical.

I was initially going to build the entire house myself. However, as I am a photographer and Wendy works in Brisbane, we had time constraints, so we contracted a builder to construct the building for us with a build time of around 3-4 months. We organised and paid for all the earthworks, which was cut and fill, separate from the build and slab costings.

We had a contract for $90,000 with the builder, including a Prime Cost (PC) sum of $14,500 for the slab. We knew the PC sum was low, but understood that variance is normally 10% and if it was to be higher, we would be advised in advance with both parties signing off before work was started. Long story short the slab blew out to over $50,000 and, despite attempts by us for mediation, the builder would not budge; in the end, we parted ways. A settlement was paid, and we had a slab, frame, roof and some windows completed.

Up to this point I had been working with the builder to reduce costs, so had done considerable work erecting the wall frames and roof frames. I had settled on the builder doing the roof so we had insurance if the roof leaked. Now with the main structural part of the building complete, it was up to me to finish. One of the hardest tasks was to find trades willing to finish off work that had been started by other trades, in case they were faulty. I had to absolve the trades of defects caused by the previous work before they would start, fair enough too! We finally sourced an electrician and plumber (both local) willing to take on the job and basically saved the build. Some very nice neighbours with building history gave me plenty of advice and lessons on how to do various jobs.


## Material world

The house is steel framed, with *Colorbond* cladding in Dune colour and *Klip-Lok* roofing also in Dune, a colour that would blend into the hill and surrounding trees. The front entry wall is *Scyon Matrix*, to provide a feature and colour contrast to the *Colorbond*. All walls and ceilings are insulated with *Rockwool*, an ecological product with excellent insulating values. All ceilings are raked and they were a task to install, as at one end the ceiling height is around 4.5m.

Lighting is LED except for some pendent lights. Cooling is courtesy of ceiling fans in each of the rooms and three in the main living area. With 34m$^2$ of glass along the back of the house, we have had to put up heavy curtains to help keep the house cool in hot days and to provide privacy for the bedrooms. To keep in line with the high ceilings the curtains are around 2.5 metres high.


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The lounge room has a single wall without a window for which we designed a full height book shelf, suspended by threaded rod fixed to battens in the roof space for that purpose. Across the bottom is a concrete stereo cabinet which is 5m long and set up off the floor to give the feeling that the threaded rod is also holding up the cabinet. I constructed the concrete cabinet in situ, using 50 bags of concrete mix, finished off with grinding to smooth it off and then sealed with a clear finish to prevent staining. The TV is set into a space made for it in the shelving with cabling hidden in the walls.

The floor is all bare concrete, or was supposed to be. The builder didn't do the wet areas correctly and, to pass certification, I had to tile the floors in the bathrooms and laundry. This resulted in raised flooring because of the water proofing cement that had to go down but thankfully it does not detract from the overall look. The floor has had a slight honing and is finished with a gloss resin, which shows slight cracks and imperfections and adds to the whole feel of the house and contrasts nicely with the stark white walls.

To keep costs down we fitted a kitchen from a kit kitchen supplier, with the same for our robes and laundry. The *Caesarstone* benchtop is an extravagance that finishes if off nicely. The gas electric cooker, microwave and fridge fit into a neat compact space.

Constructed from practically 100% recycled material, the 'Chook Mahal' houses two chickens that provide us with most of our eggs.

The house is connected to the grid , however there is provision for when we can do a solar installation.

As we are not on town water or sewerage we had to install our own septic system, opting for a *BioCycle* wastewater treatment system that allows us to use the treated water for the trees. To satisfy covenants on the area we have had to install 45,000-litres of water capacity, which we have done with two 22,500-litre tanks connected to a constant pressure pump. There is a third 5000-litre tank for watering the vegie patch and garden. Eventually an irrigation system will be set up incorporating the dam to save on our drinking water.


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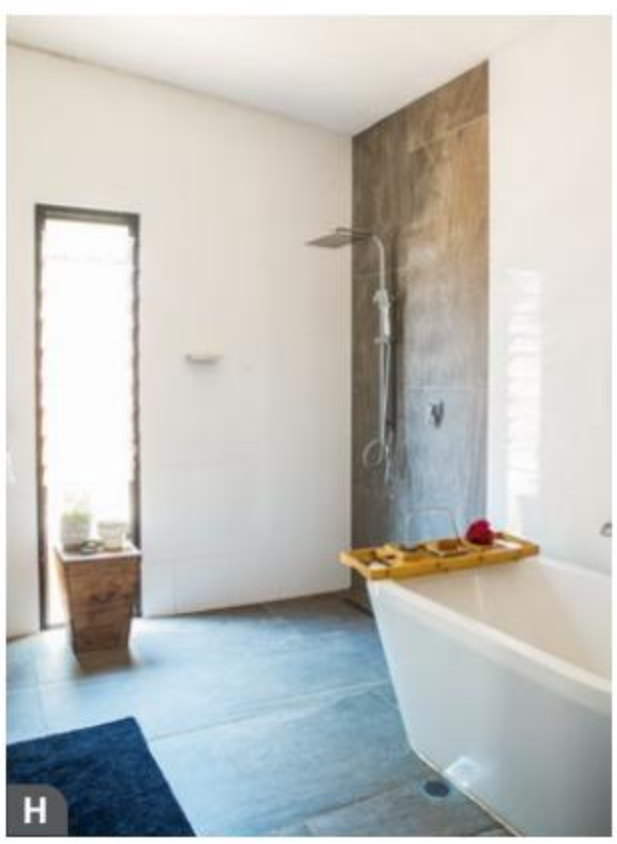
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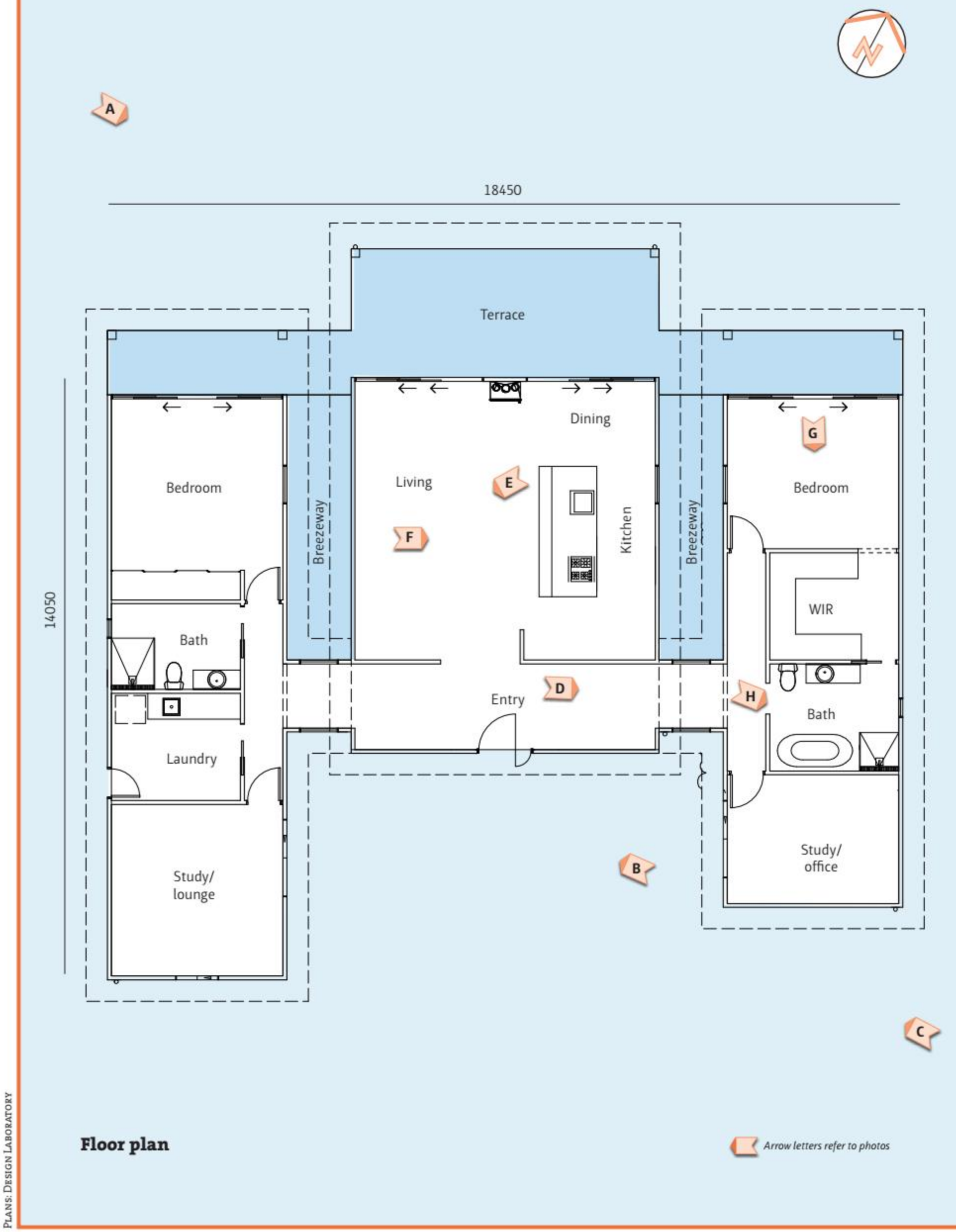



**Floor plan**

*Arrow letters refer to photos*

PLANS: DESIGN LABORATORY

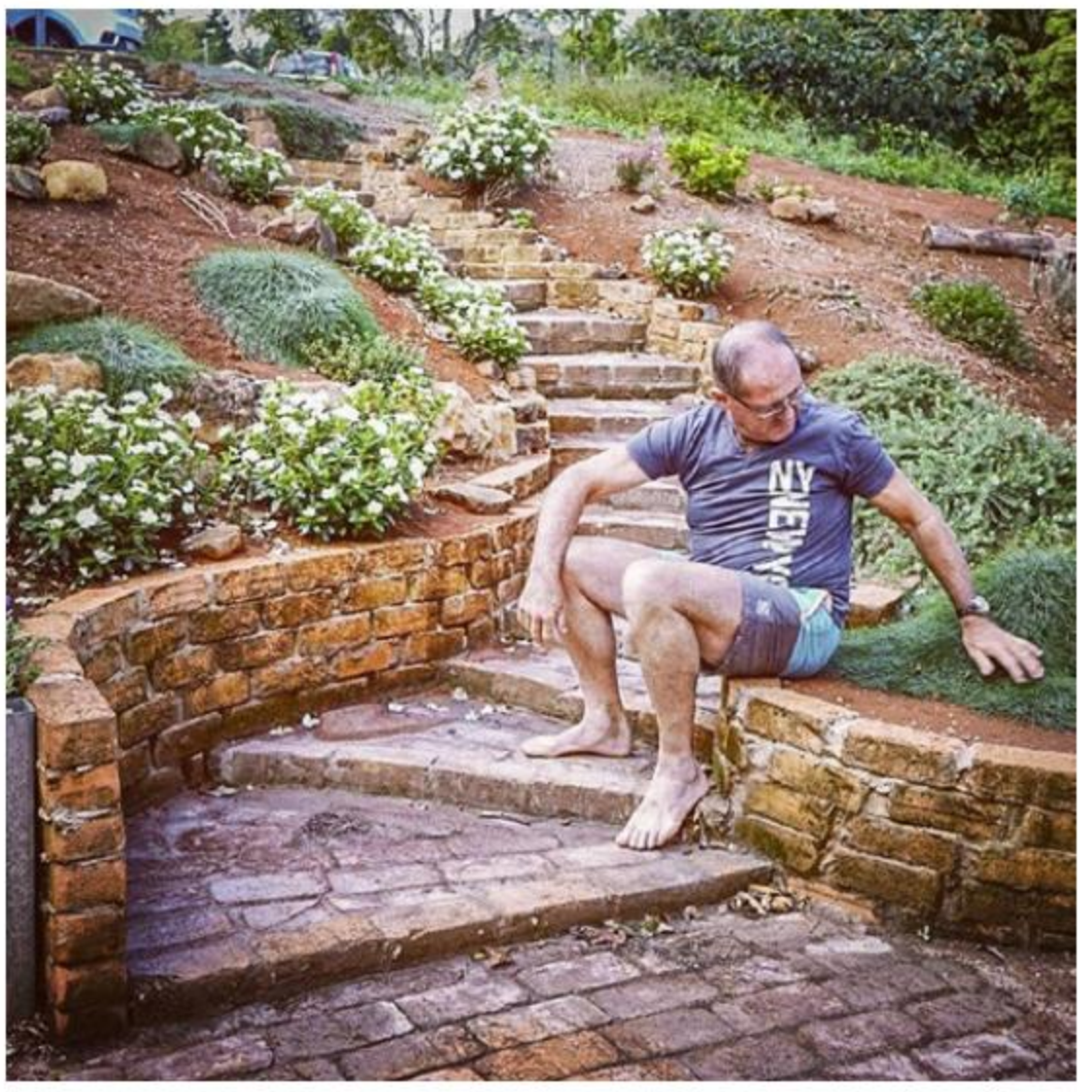
## Minor changes

As with most buildings we went through some changes during construction. We were able to amend some room dimensions before the framing was constructed but other changes meant we had to re-configure some of the frames as we went, which was not a major drama. We had no issues with approvals from council whatsoever and they were brilliant to deal with.

It has been three years since we began construction. Hold ups while we were in dispute with the builder cost us several months and basically I have completed all the cladding (internally and externally) by myself with the odd hand from some gracious friends. The eaves are in place, but the joins have to be plastered and they need painting and we need to redo the painting in the interior as we want a whiter white. That aside, the house is complete.

I have been working designing the garden, building retaining walls, arbours, garden seats, paths and fencing the driveway, which is over 160m long and has a roundabout. Paving around the house and the front garden stairs are all recycled as are all the posts and rails for the fence along the drive. We have even recycled an ancient rambling rose, which came from a farm I was doing some work on. The original rose was planted 100 years ago, so we have a real piece of Beechmont history right in our garden. ◆

Lynda says, 'Nicco is a constantly smiling presence at **estabar**, my favourite local beachside cafe. He is also a phenomenal photographer, sharing his early morning visions of Newcastle beach as well as nature and travel photography. His Father's Day Instagram post started a chain reaction that resulted in this article.'



**hyperventilating_eyes** Dad loves Pink Floyd, Led Zeppelin, Supertramp and Beethoven. He enjoys his garden and doesn't like it if you don't laugh at his jokes. He is known for hilariously unlucky situations, which is bad for him but funny for us. Takes a banging photograph and cooks a mean curry. A wonderful dad... happy Father's Day.

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◆ **Imagine Kit Homes**
Steel framed architecturally designed kit homes.

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# Coming events...

## SA PERMACULTURE DESIGN CERTIFICATE COURSE, WORKSHOPS & OPEN DAY

GAWLER

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MAY: PDC with David Holmgren, the Brookmans & guest tutors at The Food Forest

- Design sustainable homes, gardens, farms, businesses & communities
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Taught at The Food Forest, a multi-award winning certified organic permaculture property on the Gawler River in SA.

***www.foodforest.com.au***

## AUS LOST TRADES FAIR

BENDIGO, VIC – 7-8 MARCH
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SYDNEY, NSW – 24-25 OCTOBER

Celebrating the art of skilled manual work, ancient crafts and rare trades, the special tools, traditions, languages and secrets that go hand in hand with these trades.

***0412 363 632, www.losttrades.info***

## NZ LOG BUILDING COURSE

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***www.logbuildingnz.org.nz***

## AUS TINY HOUSE FESTIVAL

VIC – BENDIGO: 21-22 MAR
NSW – GLENWORTH: 17-18 OCT

Celebration of all things 'Tiny Living' related: displays, speakers, workshops, LIVE builds, DIY village and sustainability market.

***www.tinyhousefestivalaustralia.com***

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ONGOING

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BALINGUP
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***www.balingupsmallfarmfieldday.com.au***

## NZ NATURAL BUILDING

VARIOUS LOCATIONS AND DATES

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***www.soldesign.co.nz***

**Autumn 2020**, Golden Bay, South Island, Timber frame tiny house course
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ELDORADO
18-19 APRIL

Celebrate and investigate off-grid living, learning the essential steps to a sustainable lifestyle. Consultations, workshops, demonstrations, talks, products covering sustainable energy, home & building, alternative farming, tools & handcraft.

***www.offgridlivingfestival.com.au***

## NSW SMALL FARM FIELD DAYS

MUDGEE
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***www.renewfest.org.au***

## USA LIVING ROOF AND NATURAL BUILDING WORKSHOPS

VARIOUS LOCATIONS AND DATES

Hands-on natural building experience with expert Sigi Koko. A wide variety of topics including living roofs, cob, tadelakt, lime plaster. See website for dates and topics.

***www.buildnaturally.com***

# Line ads...

**AUSTRALASIAN STRAW BALE BUILDING ASSOCIATION:** Promotes the use of straw bale construction. www.ausbale.org

**EARTH BUILDING ASSOCIATION OF AUSTRALIA:** Furthering the use of unfired earth in construction. www.ebaa.asn.au

**NILLUMBIK MUDBRICK ASSOCIATION:** To protect and promote the mud brick building industry. www.mudbrick.org.au

**PROPERTY FOR SALE – WEST TOODYAY WA:** Fantastic opportunity to buy our amazing pole framed straw bale house on 60 beautiful hectares (148 acres). 1000 mature olive trees, abundant potable water from windmill and bore, mains power and large workshop, 9km from historic town, an easy 80km drive from Perth. House recently upgraded to current building code and bushfire standards and is fully Shire approved. See www.realestate.com.au > Search for '869 Julimar Rd, West Toodyay'

*See photos below.*

**FOR SALE – Rammed earth house, Gold Coast Qld:** Unique Peter Lees designed house on secluded 20 acres of rainforest. https://house.Davis.net.au

*See photo above.*

**CYPRESS SAWMILLER:** Cypress macrocarpa graded to F7 or better. Up to 500x250mm wide and 6.5m long (maximum width and length). Phone 03 5659 7211 or 0418 361 539. (Strzelecki) www.maddockscypresssawmill.com.au

*See photos below.*

**CERES FAIR WOOD:** A robust and transparent brand of timber . www.ceresfairwood.org.au

**LOG BUILDING ASSOCIATION OF NZ:** www.logbuildingnz.org.nz

**EARTH BUILDING ASSOCIATION OF NZ:** www.earthbuilding.org.nz

**THE LAST STRAW (TLS):** International journal of straw bale. www.thelaststraw.org

**THE GLOBAL ECOVILLAGE NETWORK:** www.ecovillage.org

**CERES COMMUNITY ENVIRONMENT PARK (Vic):** www.ceres.org.au

**RANDWICK SUSTAINABILITY HUB (NSW):** www.randwick.nsw.gov.au

**WITCHCLIFFE ECO VILLAGE (WA):** www.ecovillage.net.au

**THE ECOVILLAGE AT CURRUMBIN (Qld):** www.theecovillage.com.au

**CRYSTAL WATERS ECO VILLAGE (Qld):** www.crystalwaters.org.au

**THE ALDINGA ARTS ECOVILLAGE (SA):** www.aldingaartsecovillage.com

**WESTWYCK ECOVILLAGE (Vic):** www.westwyck.com

**NARARA ECOVILLAGE (NSW):** www.nararaecovillage.com

**THE PADDOCK ECO VILLAGE (Vic):** www.thepaddock.com.au

## Line ads and Coming events

Advertise goods or property you have for sale or exchange, or an event. Also a space for associations and owner builder groups.

**Deadline for next two issues:**

***218 Jun-Aug 2020*** – 7 Apr 2020

***219 Sep-Nov 2020*** – 7 Jul 2020

**Cost:** 80 cents per word.

Must be paid in advance.

**ADD A PHOTO!**

For an extra $15. *(Line ads only)*

# Visit to Mapazi

BY TIM HAMER

*Until recently, I had no intention of visiting Africa. Then I found myself in Zambia for 10 very interesting days. How did this happen?*

I have been an avid reader of *The Owner Builder* magazine since its inception. In issue *212 April/May 2019*, I read about the building of the Mapazi Bush Camp on the banks of the Luangwa River in the South Luangwa National Park. I was intrigued by the adventurous attitude of the principals, Jane and Deb, so emailed them inquiring about how one got to stay there. They passed my details on to Wildman Safaris, who designed an itinerary that would include a 3-night stay at Mapazi Bush Camp.

Mapazi is set in a remote part of the South Luangwa National Park and thus has a need to be self-sufficient. My journey included a flight from Lusaka (capital of Zambia) to Mfuwe where I stayed in Flatdogs Camp before transferring to Mapazi. The return journey included another stay at Flatdogs before flying out to Victoria Falls.

## Wildlife aplenty

The camp is situated in an area that has a thriving population of wild animals; elephants and other game strolling through the middle of camp happened while I was there! Each day we did a morning and afternoon walk in the surrounding bush.

Our party consisted of Deb the guide, sharing her phenomenal knowledge of the bush with her guests, a trainee guide to carry and set up the tea items, and the compulsory armed guard – called a

scout – a requirement of the Parks Service. Jane also accompanied us on some of the walks, camera in hand. We saw elephants, hippos, impala, zebra, giraffes, waterbuck, hyenas, warthogs, monkeys and baboons., as well as lots of birds and the occasional lion. Hay fever sufferers (like me) should not forget antihistamines for this time of year, though.

The chefs supplied three delicious meals a day including jaffles for lunch one day, to the interest of the other guests, an English couple, who had never seen them before. We usually ate near the riverbank where we could see hippos and crocodiles. I rapidly got used to the idea of a 'sundowner' gin and tonic before dinner each evening in these surrounds.


Photo: Jane Addey

## Demountable infrastructure

As detailed in the original article, Mapazi has three luxuriously appointed tents and a tented bar, built around a sausage tree, for guests. The tents and the accompanying bathroom tents are beautifully appointed including hot showers, thanks to *The Rocket* wood fuelled hot water heater manufactured in South Africa. This system works really well, being fuelled with a small amount of light twigs etc. to heat the water about 15-30 minutes prior to showering.

Photo: Jane Addey

Behind the scenes are various dedicated buildings, including a wonderful bush kitchen, office and staff quarters, where the work of cooking, cleaning and maintenance is carried out. Guest phones and camera batteries are charged using the solar power system.

It is remarkable to think all this infrastructure is dismounted, packed and stored at the end of the season! And then brought back in for the following season. A credit to the design, building and logistic skills of Jane, Deb and their terrific team. Thanks for a memorable stay. ◆

- **Surefoot Safaris**
  Privately guided walking safaris in South Luangwa National Park. Please mention *The Owner Builder* magazine if you get in touch.
  *www.surefootsafaris.com*

- **Jane Addey**
  Wildlife and nature photography, bespoke 'Safari Art' interpretive images.
  *www.janeaddey.co.uk*

- **Conservation South Luangwa**
  Working with community in the protection of the wildlife and habitats.
  *www.cslzambia.org*

- **Wildman Safaris**
  Exploring remote and authentic safari camps in Southern Africa.
  *www.wildmansafaris.com*

- **The Rocket**
  Combustible fuel, dry wood hot water heater. Stand-alone or in series with an existing hot water system.
  *www.water-heaters.co.za*

# The final push

## *Finishing of our healthy home*

***In TOB 213 June/July 2019, the reasoning behind this project was featured.***

**BY HELENE LEANE AND LUC HOFFMANN**

When is something really finished? That's the question that has come to mind when completing our build. There are always details to attend to, and often the smallest detail can have the largest of impacts on a project.

I had a look through our Development Application (DA) documents recently and was surprised to notice that we submitted them in September 2017 and obtained our Construction Certificate in March 2018. It is now December 2019. We were originally going to build with hemp blocks but changed our plans to use Steico ***Protect H*** 60mm natural wood fibre boards with 100mm insulation batts instead. Incorporating new and different materials into your build has to be done with awareness and precision, hence the longer time frame. Working with tradesmen also can bring surprises, and delays. Be prepared to check, and double check, all workmanship – this will prevent frustration, unnecessary costs and extra personal workload in the future.

So, we are at the finishing stages, and I will walk you through some of the more interesting steps it took us to get here.

A

## Healthy and thermally comfortable

Our house is built along bio-climatic principles. We are using healthy building products to create a thermally comfortable home all year round. In *TOB 213 June/July 2019* we were at the exterior cladding stage of the build. We had installed battens and mesh for ventilation, and screwed cement fibre boards to the battens. We painted the cement fibre boards a light colour to reflect the heat, which makes a huge difference to internal heat absorption. To test the difference, we painted some spare boards a dark grey. We then checked the surface temperatures of both after being in full sun when the air temperature was 30 degrees. The light colour cladding registered at 35 degrees, whilst the dark painted cladding was 60 degrees. This clearly demonstrated the thermal benefit of using light colours for exterior surfaces.

We were keen to develop a conventional look, as we wanted to demonstrate that the use of wood fibre products does not create design restrictions. After installing the cladding, the house was looking very conventional despite all its super insulated interiors. Because the insulation is hidden from view, we have made a mock-up of the wall components to show visitors how the walls are constructed and how they achieve the R4 energy rating.

Concentrating on the interior of the house, we arranged for plasterboard

to be installed to the ceiling and walls. Plasterboard is 'breathable' and therefore suits our interior health requirements, but it requires a lot of manpower for installation and finishing off. To save time, we considered using a plywood finishing board and we may incorporate this into our next build to see how it looks and performs.

## Internal fitout

To paint the ceiling and walls we chose a natural, breathable paint from *Livos*. It took some getting used to as it is very thick and dries very quickly. It took twice as many coats as conventional paint. It is 'chalky' and reminds us of render. We painted the bathrooms with a low VOC acrylic paint as the walls are lined with fibre cement board that is not moisture permeable.

In the bathroom, the ventilation fans vent to the outside of the house thus preventing any internal moisture build up. We installed underfloor heating, heat lamps and heated towel rails to keep the bathrooms warm.

The internal fitout was very successful. Newcastle based cabinetry company, DSA Kitchens, was willing to use E0 boards for all the kitchen and laundry cabinetry. The installation was a breeze. We also arranged for recessed storage pantries in the hallway.

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We made the decision to cover the concrete slab with vinyl and cork flooring, which may seem unusual with a passive solar design. However, this decision was based on two principles. Firstly, our house has such high thermal mass in the building envelope that the penetrating heat during the winter, through the windows, will be adequately stored during the day in the walls and ceiling, and released inside during the night. Our insulation is of sufficient high density to achieve this result. Therefore, the dependence on the thermal mass of the concrete is not as important. Secondly, the reason was to do with the Livable Housing Guidelines. We wanted a floor with a 'soft' surface that was comfortable to walk on. This would suit families with small children and the elderly, who need surfaces that are not hard and potentially physically damaging.

We placed a 7mm wood fibre insulation mat called *Underfloor* from Steico on top of the concrete, then installed a Wicanders *Hydrocork* floating floor that has a cork base and vinyl surface. The flooring was rated E1 and it did take a few weeks to off-gas. Having said that, we have had visitors with extreme sensitivity to chemicals who were not affected by the smell. This was a very significant test for us, and our visitors were able to stay in the house without any signs of discomfort.

Tiling was a very time consuming addition to the build. We tiled two bathrooms, a laundry and had underfloor heating installed. There is a trend in Australia to tile all of the bathroom walls but we thought this would create unnecessary echo and too many cold surfaces. We only tiled the wet areas, and painted the rest.

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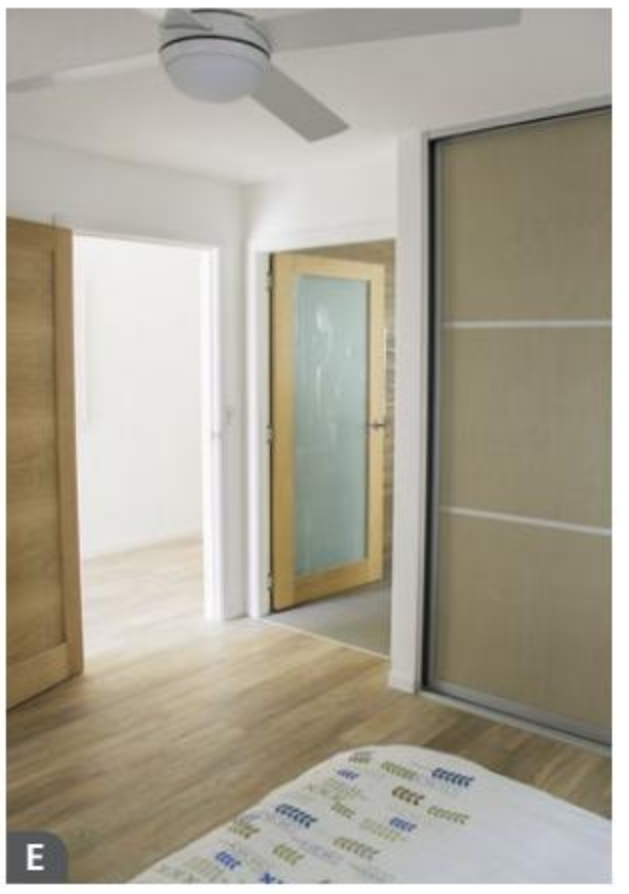

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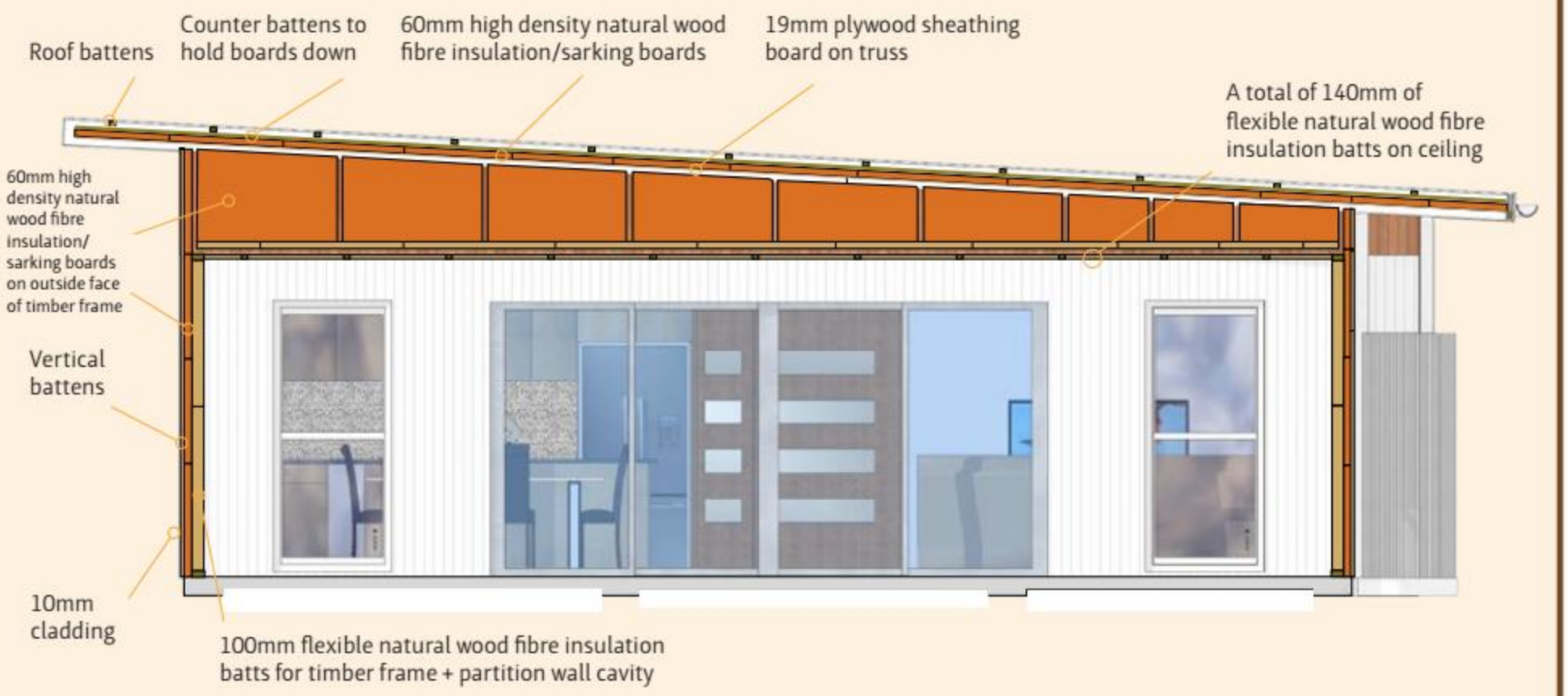
## Air temperature testing

At this stage, once the painting, tiling, and kitchen install had finished, and the house was airtight, we were able to start testing internal air temperature. After all, that was one of the key features of having natural insulation – the house was designed to stay warm in the winter and cool in the summer. We were able to test internal air temperature, surface temperature and humidity levels in the winter month of July 2019. We discovered that without any heating, in the morning between 7 and 8am the outside temperature was 9 degrees and the internal temperature was 16 degrees, with the internal walls being 16.5 degrees. The relative humidity averaged 58%.

Spring quickly turned into an early summer and, although the nights remained cool, temperatures increased rapidly. During November we had days of over 35 degrees. To manage heat correctly it is important to keep the hot air out of your home; this means keeping doors and windows closed until the temperature cools down in the evening. Then you must open all the windows and air the house out during the night. This ensures the internal temperature of the home will take on the ambient evening temperatures. If your insulation is effective and is able to delay the heat transfer during the day then internal temperatures should remain quite comfortable. The high density wood fibre board, *Protect H*, has this quality of delaying heat transfer. We will be testing the temperature and humidity of the house and roof space starting in January for a period of six months. We will then publish our results.


**Floor plan**

Plans: Luc Hoffmann, Maisonbio




**Section view**

## *Mock-up wall – R4 energy rating*

Battens – a double layer made of formply, perpendicular to one another.

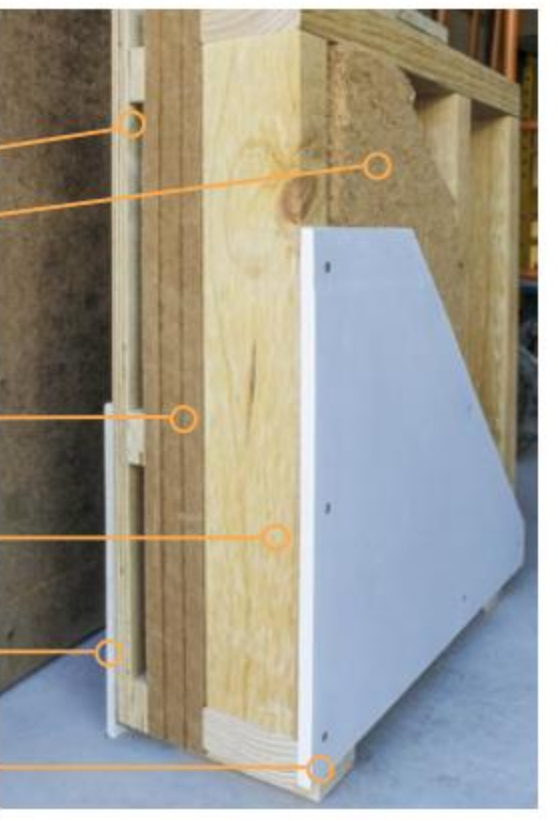
100mm wood fibre batt insulation

60mm wood fibre board, tongue and grooved

90 x 45mm untreated radiata pine stud wall

Fibre cement panels (external)

13mm plasterboard (internal)



PLANS: LUC HOFFMANN, MAISONBIO

## Reflective heat

Blinds were installed on every window except the bathrooms and this helps to keep out any direct sunlight in the spring. We also had to think about reflective heat from the outdoor entertaining area and do some problem solving. The interesting thing about passive solar design is that you really need to consider the exact movement of the sun throughout the whole year and what landscaping you require to counteract any unwanted solar gain.

In our case, we have a large 45m$^2$ patio outside our north facing windows that are protected by 900mm eaves in summer. We still need to allow sun in during the winter but stop any reflective heat in the spring/summer. After considering fixed pergolas, automatic pergolas and deciduous vines, we will be installing a 7x3.5m retractable awning that can be controlled as the weather demands. This was an expensive option, as we wanted the best quality material and motor (both made in France, but put together in Gosford). We will also plant small trees and shrubs towards the back of the patio to create shady areas.

## Power choices

There was one last consideration that was also very time consuming, and that was the lighting choice. During 2018/19 our local lighting stores began to stock surface mounted device (SMD) LED lights in their showroom. These type of lights are designed as a fitting/bulb all in one, and when they fail the whole fitting has to be replaced. Although the lights are designed to last a long time (five years or more) the fact that the whole fitting has to be thrown away is not sustainable. This meant that I was scrambling to buy light fittings that would hold replaceable LED bulbs or fluorescent battens.

Our internal garage has been treated like an internal room in the house and we installed a garage door that was insulated and a solid door connecting to the house. The window is double glazed with blinds.

On the wall of the garage we have installed our Electric Vehicle (EV) charger – it's a level 2 charger, called *The Zappi*. It is a 7.2 kW charging station and allows for the choice of charging between grid power or home solar production. This suits our goals, as we have created an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all-electric house powered by a 9.6kW solar array, currently producing on average 40 kW per day. We power an electric cook top and stove, 300-litre hot water tank and infrared heating. We have also purchased battery operated tools and garden equipment, including a lawn mower. Although we want as little lawn as possible in our native garden, there is the footpath to take care of occasionally.

We also received our first electricity credit during September. This meant that no fees were incurred for electricity connection as the solar rebate kicked in as soon as connection was sorted. We were exporting power immediately. Since July until December 2019 we have also generated a total of 4900kW. We will monitor and record results of our electricity production, consumption and export over the next six months.

'Will you be in before Christmas?' Well, yes we were – the garden may not be complete or the paving 100% but otherwise Christmas in our new home was very welcome.

Our owner builder experience has been both exhilarating and tiring. We have gained so much knowledge that we are ready to open our home to share with other potential owner builders the paths and pitfalls of such a project, through Dungog Healthy Home. ◆

*Helene Leane is a practicing artist who has always been driven by environmental concerns. Building a healthy home actively demonstrates change in building practices.*

*Luc Hoffmann has a wealth of experience concerning bio-climatic design principals. Dungog Healthy Home showcases his knowledge, and demonstrates the effectiveness of the science behind healthy building techniques.*

## HEALTHY INTERIORS

The less toxic materials that are used in constructing a building, the better air quality we will enjoy. Your house shouldn't make you sick. This is how we are minimising chemical build-up in the home:

**Building envelope**

The timber used in the building frame is untreated, that means free of chemical treatment. The roof trusses are also untreated, except for the top cords which are made of treated light organic solvent preservative (LOSP) laminated veneer lumber (LVL). The exterior cladding is fibre cement panels.

**Insulation**

The high density natural wood-fibre boards on the building envelope are free of VOC's and neurotoxins, as are the flexible wood fibre insulation batts used in the framing and partition cavities.

**Paints and finishes**

All internal walls and ceilings are primed and painted with vapour permeable paints and with very low VOCs. All wood surfaces are primed with water based finishes or with natural oils.

**Caulking, adhesives and foams**

Low VOC silicon and adhesives were used sparingly. No gap expanding foams were used within the living areas of the building.

**Termite protection**

Our anti-termite plan guarantees no toxic fumes while still protecting your home.

**Ventilation**

The layout of the building is designed to take advantage of the natural air flow of the local geography. All the windows and doors are tilt and turn, and open fully to allow cross ventilation throughout the home.

**Low VOC cabinetry**

E0 plywood and MDF was used for the cabinetry in the kitchen and internal fit-outs.

**Flooring**

We have chosen to install a cork based vinyl floor, which has good insulating properties. It has a low VOC rating for the vinyl surface, and is water and slip resistant.

◆ **Dungog Healthy Home**
Creating a unique healthy building solution.
*0434 395 158,*
*www.dungoghealthyhome.com*

◆ **Helene Leane**
Visual artist, making one off, unique monotype prints on paper. Gallery on Dowling in Dungog, NSW.
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◆ **DSA Kitchens**
Manufactured locally in Newcastle, NSW.
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*www.dsakitchens.com.au*

◆ **YourHome**
Environmentally sustainable homes.
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*03 9762 9181,*
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◆ **Steico**
Wood fibre insulating materials.
*www.steico.com*

◆ **Wicanders**
Cork floor and wall products.
*www.wicanders.com*

# Massive rammed earth

BY LYNDA BRIGHTON

Not visible from the road, the sinuous treed driveway further hides the house from view until the last minute. Since my visit to Tweed Shire NSW in November 2018, the house has been completed and a thriving garden is already softening the new edges.

This is a massive house by any scale, with high rammed earth walls externally and internally and an overall floor area of around 300m$^2$. Nevertheless, the project was completed quickly; construction started in July 2018 and completion was September 2019. Frank was assisted by Mark Smith Constructions, and the rammed earth walls were completed by Rammed Earth National.

Frank greeted me with a firm handshake and a huge smile, only too happy to show me around his masterpiece. Having built and renovated many homes over the years, this was the build they were all leading up to; he confesses to having a few sleepless nights wondering if the dream in his head was going to be realised. It has.

## Great room for entertaining

Robyn meets us at the entry, which leads straight into what can only be termed 'the great room' – an open plan kitchen, dining and living area, with high cathedral ceilings and exposed trusses.

The kitchen screams 'we love to entertain!' with lots of below counter storage, a 6-burner cooktop and large oven, and large windows that hinge upwards to open up to the outdoor entertaining area, with discreet pull down insect screens.

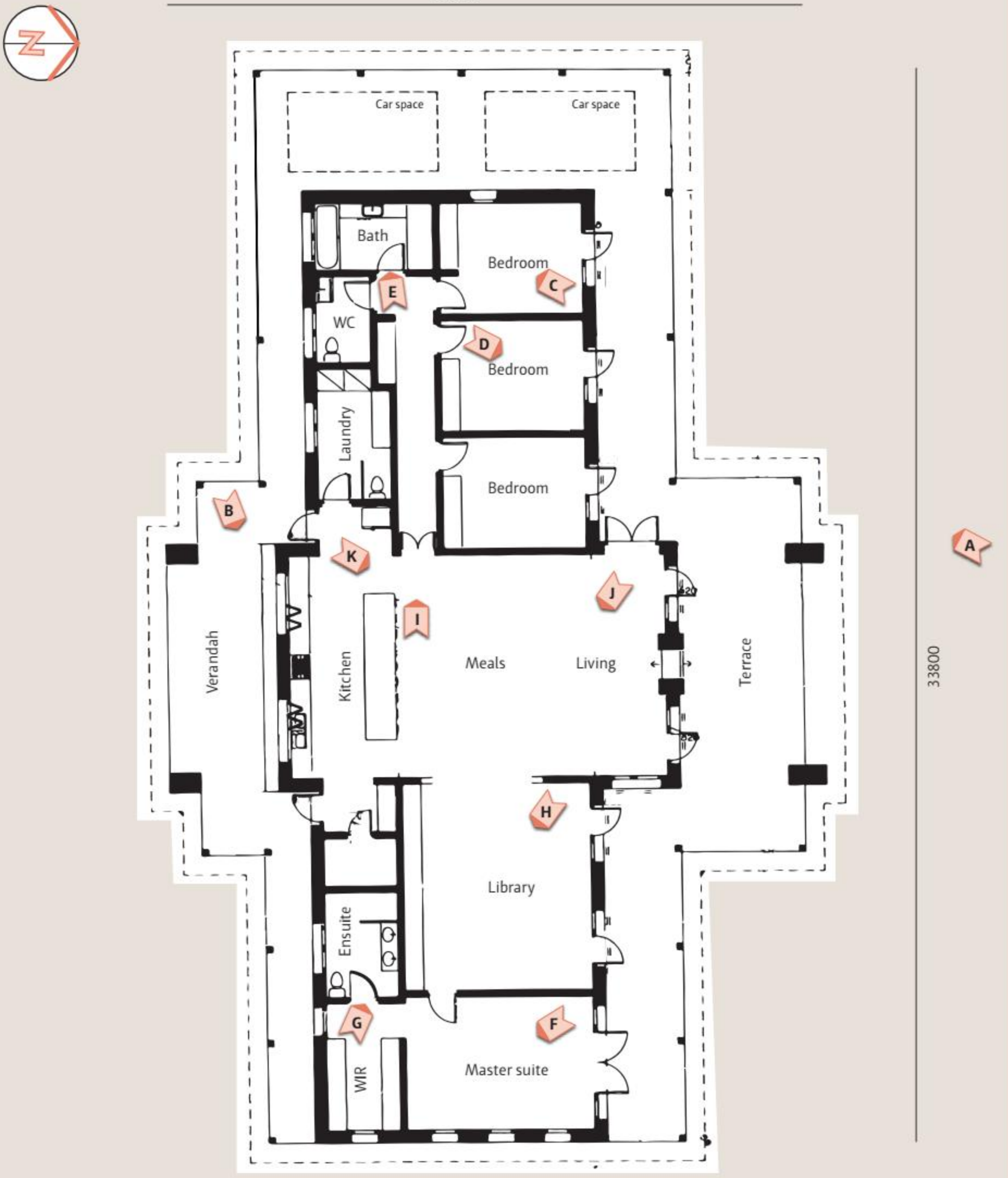
A


Genie GS-1932


Thrown in place, the concrete countertop with waterfall edges stands its ground among the weight of the rammed earth surrounds. It was a serendipitous find; the floor concreter, Peter Dwyer, did such a fantastic job that Frank asked if he could do benchtops. Peter replied that he'd never done one before but was happy to give it a go. The highly polished concrete surface shows an amazing variation in colour, with the ceramic double kitchen sink making a bright splash against the grey. The quality finish is further enhanced by the workmanship of Martin Johnston on the superb kitchen cabinets.

There is a large alcove for the fridge and a dedicated wine cellar, surrounded by rammed earth walls and accessed via a heavy solid timber door, that maintains an even temperature.

A double sided fireplace takes pride of place in the living area and is a welcome addition on cold winter nights, especially when sitting out on the verandah enjoying the peace and quiet of the bush. The concrete hearth was also formed in place by Peter.




**Floor plan**

*Arrow letters refer to photos*

PLANS: AF DESIGN

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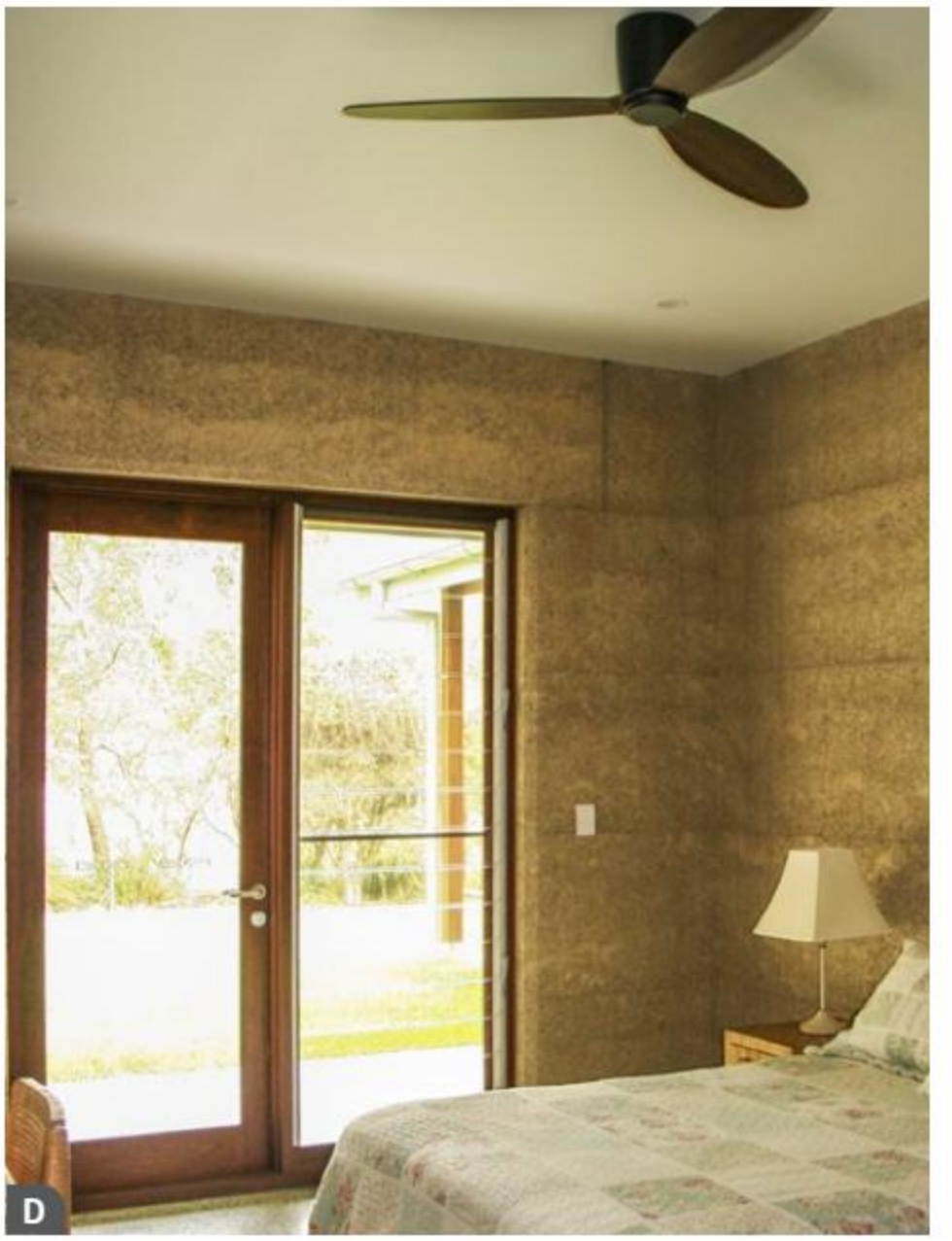

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## Bedroom wings

To one side of the living area there is a library and the master retreat-suite, with walk in robe and ensuite. A beautiful custom made blackbutt broadsheet newspaper reading top for the desk, made by Coopers in Caringbah, caught my eye. Frank laughed as he told me that the day after the desk top was delivered, his favourite newspaper stopped printing in broadsheet format.

To the other side, are a bathroom, toilet and three bedrooms; all the same size, with one wall of custom built blackbutt floor-to-ceiling cupboards, meticulously finished. The cupboards, library bookshelves (blackbutt with jarrah shelf) with ladder and the wine cellar shelving were all built by Marcus Cranney, who is a master shipwright, cabinetry maker and superb craftsman.

All bedrooms have large windows and doors out to the covered verandah.

Ornately carved Balinese-style cabinets and mirrors have been used as vanities, topped with stone basins. Travertine tiles have been used on the rammed earth walls, as backing for the shower, basin and bath. Small mosaic sections in the shower recesses catch the light. The main bathroom has a shower and bath, and there is a separate toilet. In-wall cisterns for the toilets keep the look minimalist, and the brushed stainless steel of the *Phoenix* bathroom fixtures blend in perfectly. Nothing detracts from the splendour of the rammed earth.

## Quality finishing

All the kwila windows and 2.4m high solid doors were custom made by Teal Windows. The neat chamfering of the window and door openings in the rammed earth combines beautifully with the quality timberwork. Fixings are mostly stainless steel and are often exposed, for example the screws holding the window frames in place, large bolts on the trusses and the door hinges.

There is a polished concrete slab throughout. The finish in bathroom and toilet is slightly different to the rest; the waterproofing sealant was done after the initial pour and the final concrete pour to these areas was a slightly different mix, with smaller stones. It has also not been as highly polished to provide some slip resistance. Concrete-look tiles have been used as skirting; an almost exact match to the floor by coincidence.

Fans are sized according to space; a large *Resort 80DC* in the living area, a smaller *Akmani* in the library, then smaller again a *Radar 52* in each of the bedrooms. These are all remotely controlled with a reversible function for summer/winter, sourced from Beacon Lighting. Along with opening windows and doors plus louvres, there is plenty of cross ventilation and the summer has been wonderfully comfortable. They have not been in the house for a full winter yet, but did use the fire during the finishing stages and found it worked very efficiently.

It was good to see the pleasure that Frank and Robyn are deriving from this well constructed solid home. While they still travel back and forward to Sydney on occasion, now that the house is complete, those trips are getting fewer and further apart.

On my way out, I was once again drawn to the separate timber and *Colorbond* shed, also master crafted and an indication of the detail that has gone into the entire project. I found myself measuring it up in my mind's eye as a perfect small home. ◆

- **Mark Smith Constructions**
  *0418 978 201*
- **Rammed Earth National**
  *02 6677 0013,*
  *www.rammedearthnational.com.au*
- **AF Design**
  *Alan Faglioni. 0417 699 969*
- **Pottsville Concretors**
  *Peter Dwyer. 0438 761 480*
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  *02 6643 1166,*
  *www.tealwindows.com.au*
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  *0413 601 050,*
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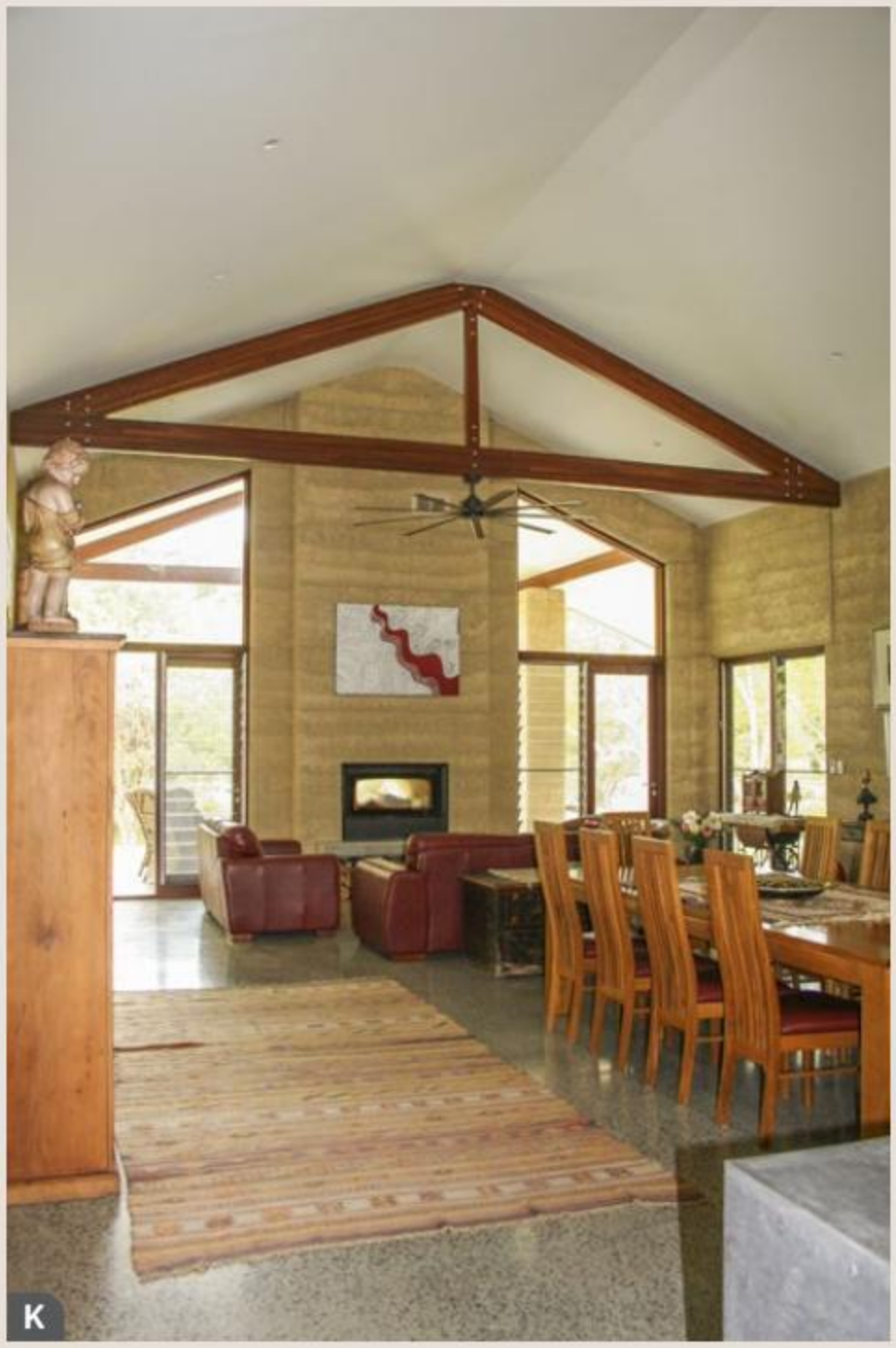
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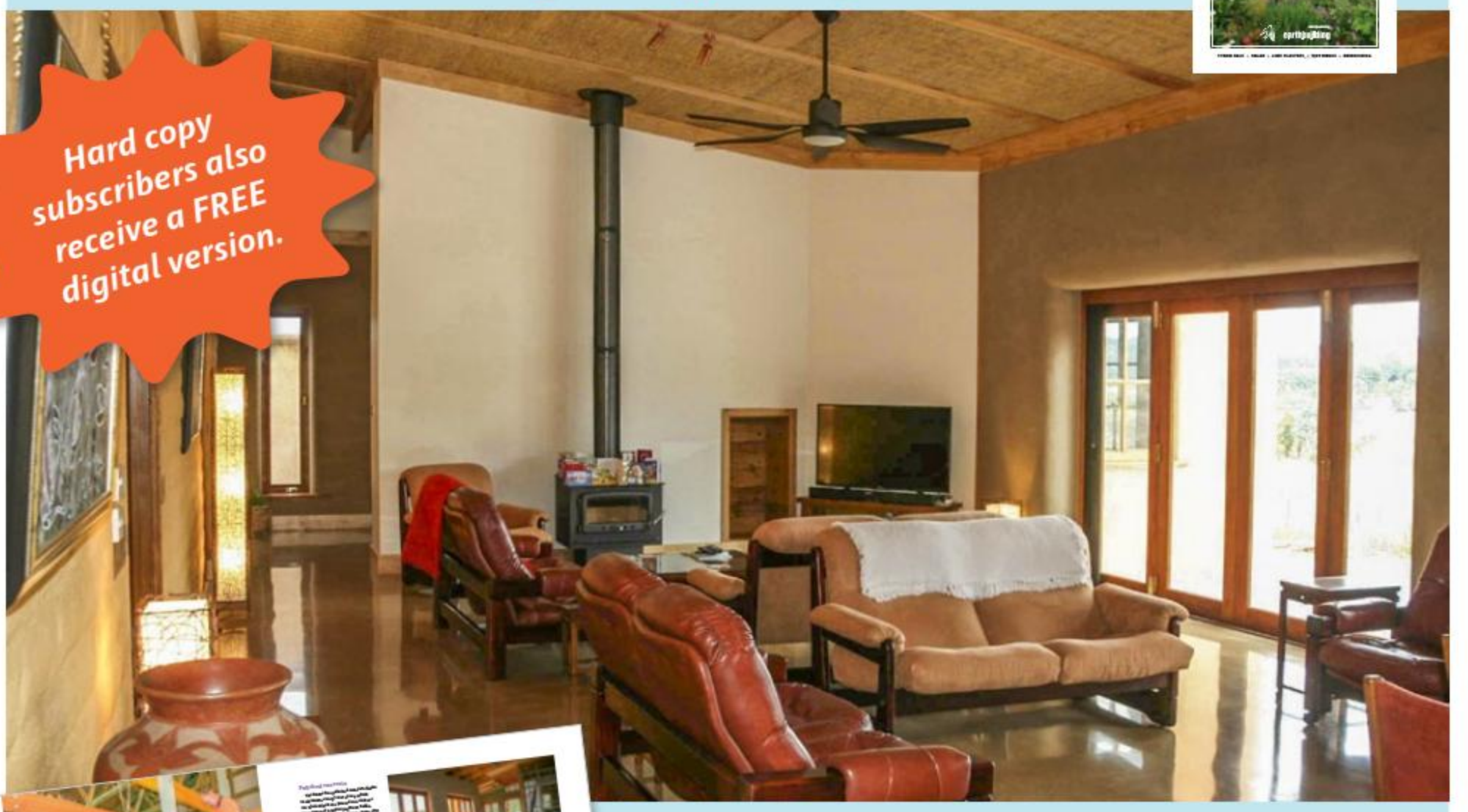


*Just want to give you a big thank you for a brilliant magazine. I love receiving each issue jammed full of wonderful ideas and experiences.*
**– Paula**

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# NZ PROBLEM!

The Newsletter of the Log Building Association of New Zealand
Website: www.logbuildingnz.org.nz Facebook: Log Building Assn of NZ

**Summer 2019/2020** **Issue 127**

LBANZ
LOG BUILDING ASSOCIATION OF NEW ZEALAND INC.

In this issue:

- Our log home journey – From dream to reality
- A little log shed
- Clever design ideas
- Chainsaws – Battery or petrol?
- Wood and moisture – Not a happy union
- ... and, of course, Logs of Laughs

# A few words from the editor

Welcome to this combined package for Australasia.

I know our membership will be pleased to see what other owner builders are up to across the ditch, and I hope *The Owner Builder* magazine readers will enjoy seeing what New Zealand log builders are doing. This combined effort is truly a win/win for all of us.

The Log Building Association of New Zealand (LBANZ) is a small group and you do not need to live in NZ, or even in a log house, to be a member. If you like what you see or have questions, please get in touch.

This time of year is not so busy for our group as our AGM is in June and our log building classes are early in the year. So it is a good time for log home owners to check the condition of their log house.

Some say that log homes are low maintenance, and they are, if you look after them properly! That means making sure water stays away from the wood. This issue includes an easy to follow chart for log home owners, or anyone with a timber covered house, to keep their house at its best.

I am on a bit of a tear lately about all the talk of carbon footprint, carbon emissions, sequestering carbon and all the other related phrases. The topic is huge and I wonder if anyone completely understands it. I know I don't but am trying to learn.

An example of this is that I recently read the label on my bioplastic (cornstarch) rubbish bags. It stated that they would start to break down in 12 months but did not indicate when they were made, and stated that they would give off $CO_2$ when they decomposed! Release $CO_2$? I then spent some time on Google and discovered that it made sense. The product is made from corn which absorbs $CO_2$ when growing. This is then released when the bioplastic breaks down. What is done to that corn in order to make it suitable to become a bioplastic is another whole topic of energy consumption and/or chemical treatment. Hmm, I'll leave that for another day.

The LBANZ log building course is scheduled for March 2020 and so far has eight registered students from all over the world. I know those students will have an amazing experience learning to build with logs and forging strong friendships along the way.

Our new website is in the process of going live so check out that address above. We would love to hear from our new friends.

Happy summer!

Marian

## LOG BUILDING ASSOCIATION OF NEW ZEALAND INC.

**The aims of the Log Building Association:**

**- to foster the highest standards of log building**

**- to monitor building code revisions affecting log buildings**

**- to offer information to log builders and the public.**



**www.logbuildingnz.org.nz**

# Sawdust and Chips

Marian Ganzeveld

## Building site documentation

### As applicable in New Zealand

When building your home, you need a building consent. This consent is based on the plans and reports you presented to council to ensure your home is built correctly, safely and the way you want. All contractors need to build according to those approved plans and specifications. It makes sense to have these documents available at all times.

Building control officers will also check these documents against the work done when they carry out their inspections, ensuring compliance that your home is constructed properly.

Before electronic devices became popular, full size paper plans needed to be at the building site at all times. Of course, they would get wet and dirty and eventually illegible. Replacing paper plans could get expensive. Now electronic formats are allowed, but only certain sizes.

Timaru District Council has issued a mandatory requirement that all approved documents must be onsite in order for an inspection to take place.

'The approved documents can be in the form of hard copy (paper) or in an electronic format (iPad or laptop), but NOT on a phone or small tablet.'

The building officer will decide whether the information is a complete set, legible, accessible and usable.

'Should these requirements not be complied with, the inspection will be failed and you will be required to arrange another inspection, which may incur further costs.'

This may seem like a harsh requirement, but the inspection process exists to make sure the building work is in accordance with the consent. If the inspector cannot read the documents, neither can the contractors. If the contractors cannot access the plans, they may build incorrectly for your design and that wastes everyone time and money.

Check with your local council for the accepted format they accept for required documentation.

## A change in our subscriptions

Members at the 2019 AGM passed a new choice for our membership subscriptions, due to continued increases in the cost of postage.

As of April 2020, the cost of a subscription including a posted newsletter will rise to $95. Those who are happy to receive an emailed newsletter will continue to pay the current $75. Invoices reflecting those choices will be sent with the 2020 Autumn (the next) issue.

## Obituary

### Farewell to Bruce McKendry

It is with a sad heart I must announce that Bruce McKendry has passed away.

Bruce and his wife Ngaire were members of the LBANZ for 22 years. He was always an active supporter of our group despite not ever living in a log house. He was a Committee member for several years. He took that position seriously, so when his hearing failed to where he could no longer take part in our teleconferences, he resigned.

I have been going through my correspondence and am surprised at how often I heard from Bruce. He would send me jokes for Logs of Laughs as well as articles about building with wood or about the insulating properties of wood.

Bruce and Ngaire advertised their hardware business in this newsletter for many years. The company produced quality brass hardware fittings and log building tools. Bruce also donated items for our AGM auctions. On attending my first meeting, I won the auction of the item that he had donated, but then realised it would not fit on the plane home. Bruce very kindly offered to deliver it.

The LBANZ will miss the support and friendship from Bruce but we will remember him with a smile. At this time, our thoughts and sympathy go to Ngaire, Mark and the rest of the family.

*Photo below: Bruce (right) at the last conference he attended in 2017, talking to Robyn and Peter Hadley.*

# A little log shed

Marian Ganzeveld


One thing always leads to the next doesn't it? My husband Andrew and I live in a 15-year-old, off-grid log house in a fairly remote part of New Zealand; we call it the 'far end of nowhere'. This project started with our need for some firewood.

Our property has a few wilding pines, a weed that makes rather useful firewood. So we selected one tree for harvest. We spent last summer having the tree cut down, bucking it up to transportable sizes and hauling it from the hillside. After splitting the wood, we realized how much firewood we had; the branches alone filled our woodsheds.

We needed another shed.

## Student built

At the same time, the Log Building Association of New Zealand (LBANZ) was holding their annual log building course. The students created a 3x3m log shed, giving them hands-on experience. They all had a chance to perfect their skills while creating a valuable portable building that could be easily sold. Back at our place, I casually suggested we buy this shed to store our firewood. When the excess firewood is used up, the shed would be just large enough to house our farm vehicle.

It took several months of discussion to finally get the project underway. I had made the suggestion even though we have very little flat land. I was concerned the shed would not fit where we wanted it, especially when we were reminded that log walls extend beyond each corner; our 3x3m shed has logs 4.8m long!

The time came and we called in our local 'digger guy', Mike. He decided his crane truck would manage the job well but there was a corner on our driveway too tight for him to get around. So our first job was to remove two sections of a short retaining wall we had installed a few years back. When originally doing that project, I had measured the width of the driveway as 3m at the narrowest point, but I missed the fact that a roof overhangs the driveway there so a tall truck could not get by.

Andrew and I set about placing some piles. We used our small digger, auger and concrete mixer and finally had a use for those leftover piles from another project.

*Anti-clockwise from top left: Required site works included reconfiguring the driveway to allow access for the delivery truck. Leftover piles were used to build the platform for the new shed. With the use of the crane on the delivery truck, the logs were unloaded in no time.*

## Transporting logs

Next came arranging transport for the shed. I decided to have it brought to our nearest town, two hours away and have Mike bring it to the house. There are trucking firms who come out our way, but a smaller truck is needed to get down our steep 2km driveway. Shipping was arranged and all parties notified, but the collection truck showed up at the log building yard a day early and gave them only 20 minutes notice.

Mike was scheduled to collect the shed from town on Monday. But someone unexpectedly turned up at his place for another project which took a few hours of his time. He then arrived on his own at the shipping yard, but since he had a crane, no one there offered to help him load the logs. So he spent 1.5 hours hooking up, moving and unhooking the 22 longest logs. That filled his truck. Now is a good time to point out that this was Mike's first log building project. He was mightily surprised at the amount of wood needed for such a small shed, despite me giving him the inventory of logs and their sizes. When he finally arrived at our building site on Tuesday morning, he wisely had his son Oliver along to lend a hand. They got stuck right in and the logs were unloaded in a very short time.

Mike thought he was being helpful by bringing all the long logs first, as usually the big pieces go at the bottom and the smaller stuff higher up, right? But our shed has two doors so some walls are made up of short lengths until the correct height is reached for a 'header' log. We could not proceed with the erection of the shed until we had the short logs too. Mike had to rush off to another job so Andrew and I decided to do a quick run into town with our trailer to get the remaining short pieces.

Now it was our turn to be surprised at the bulk of the remaining logs. At least we did get forklift help at the shipping yard. In order to carry what we felt was a safe load, we had to leave four logs behind. Home again, we were able to roll the logs off the ute using a ramp. I ran back into town the next morning for the last four. Even though the use of solid timber logs for building helps to sequester carbon, our multiple trips to town quickly offset some of that benefit!

## Re-erecting the shed

We now had a haphazard array of logs scattered around our building platform. When a log building is created, each log is carved to fit its surrounding logs, so each one is unique. The building is then taken apart piece by piece and the logs are labelled for the correct placement when re-erected. Ours had four corners, A to D, and 17 levels. Looking at our disorganized arrangement, we realised that a bit better ordering in the beginning would have been wise. Good thing this was not a 3-bedroom house.

Before Mike returned with his crane, Andrew and I managed to lay out the first row using our small digger. This is where the placement of logs is critical to ensure the building goes back together correctly, i.e. it has to be square. After several trials we finally got the diagonals within 1 mm. Close enough! The digger was helpful placing the lower

levels of logs, but I think we would have needed some ingenuity to successfully place the top rows. Mike returned to the rescue long before we got to that point.

From there it went really well. My job was to find the next needed log and to help place the logs. Mike and Andrew connected, hoisted, disconnected and placed each log. Andrew took pictures. Mike found some odd tools in his truck which helped position the logs; one was an old crowbar he'd found under his house, it worked great to roll or shift a log into place. It took a few hours but the shed was done. We felt quite proud of our accomplishment of re-erecting a tiny log shell.

We spent another afternoon placing the trusses and purlins, again with Mike and Oliver. Neither Andrew nor I are comfortable with balancing on the tops of walls, so we stayed on the ground. The next task is to get the roofing on, then cover the gable ends, oil the logs, add spouting and finally the doors. It might be a few months yet before we finally have a place to store our firewood! ◆

***The LBANZ Log Building Course has now completed at least three little log sheds. Ours will become a woodshed and eventually a small garage. The newest one is located in a small town near the Southern Alps, sitting beside a newly completed holiday bach. It will serve as an outdoor bar and sitting area. The third shed has become the smallest log chapel in New Zealand and quite likely the world.***


*This page anti-clocwise from above: With the help of our digger, the first row was laid. The unique numbering system meant the shed could be re-erected like a complex jigsaw. A crowbar came in handy for coaxing logs into place. The crane once again came to the rescue for the top rows. Opposite page: The little log sheds built by students have been put to good use; a chapel (top) and outdoor bar (bottom left) for a bach (bottom right).*

PHOTOS THIS PAGE: GRAEME MOULD, WWW.NATURALLOGHOMES.CO.NZ

# Wood is good

Marian Ganzeveld

People who live in log houses may not always be able to explain why they love them. Some just love the look, the feel, the warmth and comfort, or maybe because they could build their own.

What specifically makes wood such a great building material? Here are some of the features and benefits of using this natural, renewable product for building, and not just for log houses.

Wood:

- is sustainable and truly renewable. Once a tree is responsibly harvested, another can be planted. And you do not need to wait eons to harvest that tree and renew the cycle.
- is a natural insulator. The air pockets in its cellular structure prevent the transfer of heat or cold.
- is hygroscopic. That means it moderates humidity by absorbing and releasing moisture in its surrounding atmosphere.
- reduces greenhouse gases as trees absorb $CO_2$ from the atmosphere and store it as carbon for the life of the wood.
- is natural so there are no toxic by-products of its processing.
- is strong.
- is versatile as it can be structural, shaped to be walls, floors or furniture and used as decoration.
- can be re-used. Recycled timber becomes a feature in homes when used for beams or floors. Recycled timber for furniture produces a unique piece that cannot be duplicated.

## Did you know?

Roughly one acre (0.4 hectare) of healthy growing trees absorb almost 3 tons (2.72 tonnes) of carbon dioxide and release close to 2 tons (1.81 tonnes) of oxygen each year. As growth slows and the tree ages, less carbon is absorbed. So younger forests absorb more carbon dioxide over a given period of time than old growth forests.

About 40% of the dry weight of wood is carbon.

When we use more responsibly harvested wood, demand increases. This will encourage more well managed plantations that can make use of marginal or cleared land.

The manufacture of wood building materials has the lowest impact on air and water quality compared to concrete and steel.

It takes 24 times more energy to produce a ton (0.9 tonne) of concrete and five times more energy to produce a ton of steel compared to a ton of wood.

Concrete produces almost two times more solid waste by-product than wood.

Wood produces 31% less greenhouse gas emissions than concrete and 26% less than manufactured steel.

If instead of using one cubic metre of concrete or brick you used a cubic metre of timber, you would eliminate approximately one tonne (1000kg) of carbon dioxide being emitted into the atmosphere.

It takes approximately eight times less fossil fuel to produce a finished wood product compared to other building materials.

Concrete, steel, and aluminium come from materials extracted from the land that can never be replaced, and vinyl and most plastics are from non-renewable petroleum products.

Wood is effective in isolating heat and cold 15 times better than masonry, 400 times better than steel and 1770 times better than aluminium.

Due to its insulating and humidity benefits, wood reduces the need for air conditioning and ventilation.

Wood can last hundreds of years when properly looked after. This durability can be enhanced with modern preservatives.

A typical North American home stores approximately 29 tons (26.3 tonnes) of carbon. That is the equivalent of driving the family car for five years. Log houses contain a much higher volume of wood, so that storage would be much higher.

## Everyday life

One final benefit of surrounding yourself with wood comes from how it affects your everyday life. Research has been able to show measurable physiological and psychological health benefits when people are in spaces that contain natural elements such as wood. People are more productive, less stressed, happier and calmer, and they learn better. They have also found that patients heal faster when natural elements such as wood are in their surroundings.

'Research by Planet Ark has identified the positive associations that wood induces in people, where an overwhelming 96% of Australians agreed that wood is 'visually appealing' and 'has a natural look and feel'. Eight out of ten people also thought that wood is versatile, recyclable, renewable and long lasting.'

To summarize some of the points above, wood helps tackle climate change in several ways. While growing, trees absorb carbon, store it and release oxygen. When harvested, the wood continues to store that carbon. To process wood into a building material, less energy is needed and carbon emissions are low. This helps the impact on air and water quality. Meanwhile, somewhere a new tree is growing which can be used in less than 100 years. And it makes us feel good!

So wood is good for the environment and good for us. ◆

## *Sources*

**www.pioneerloghomesofbc.com** >About >Sustainability

**www.makeitwood.org** >Wood Benefits

**www.forest2market.com** >Resources >Blog >Search for 'Wood construction good for communities'

***Editor's note: As some of the sources are North American, where imperial measurements have been used the equivalent metric values have been included.***

# Morris House: Home of the 2021 LBANZ conference hosts

The 2021 LBANZ AGM and Conference will be held in Alexandra, Central Otago. The hosts, Jon and Clare, are the owners and builders of this magnificent house. It would be worth making the trip just to be able to step through the Hobbit door!

These photos were taken some time ago so we can expect to see some changes. There is still another year to go before this event, but if you start making plans now, you won't miss out. ◆

Contact **secretary@logbuildingnz.org.nz** for more information.

# Some clever design ideas

Marian Ganzeveld

Robyn and Peter Hadley are among the longest standing members of the LBANZ, having joined the group in 1982. Peter is a fencer by trade but also a skilled woodworker. He has built several log homes, designed and created tools to help him build those log homes and designed and built all the interior fittings. Doors, windows, floors and cabinets are made from timber he either planted, was gifted or found. He then cut, seasoned and machined it to his own specifications. Here he kindly shares a couple of ideas he has incorporated in his most recent log home.

'Designing and building can be a lot of fun, especially if you do it yourself for yourself. To my way of thinking, working out what and how to do it is the hardest part of the whole job. Over the years you see little ideas someone else has done and you had to say to yourself, 'I would not do it like that', or 'if I could alter some part of it, it would suit me better.'

## In wall storage

Peter has also made fantastic use of interior wall space. He writes, 'An interior wall is usually a 100x50mm frame with your preferred finished lining. Then you add useful cupboards, book shelves, side boards etc. which all tend to make your room smaller.

'I dressed macrocarpa to 200x50mm and used it as wall framing, hence the bookshelves and/or cupboards. We have bookshelves on the dining room side and plenty of bookshelves over our bed. We haven't as yet had an earthquake to make us think sleeping here is dangerous – touch wood.'

Peter did the same thing in the ensuite to create a convenient storage cupboard. Here he installed a door on the face to keep the small items tidy.

## Wood box

'A wood box is a classic item, usually to cart firewood by the arm-full through at least one door to get it stacked by the fireplace. Getting someone to do it is another thing. You hear, 'I did it last time.', 'It's your turn.', 'Don't make such a mess.', or even 'Hurry up, it's nearly gone out.

'We found this way very successful. Just pull the wood box out, fill it up and push it back in. Open the cupboard door, pull it out, refill the fire or oven, push it back in. The drawer rollers are just like ordinary kitchen drawers but the ones I used are rated at 100kg each. Job done!'

Peter has created this sturdy wood box through his carport log wall. Having it under cover outside makes it much more pleasant to fill on a rainy night and helps prevent water getting into the house. Inside, it is hidden in a cabinet in the kitchen. You simply open the cupboard door and pull out the wood box. The heavy duty drawer rollers make it light work. And it is conveniently right next to the wood burner.

When you are an owner builder, you have the ability to incorporate clever ideas into your home which will make your space better used and more convenient. Well done Peter and Robyn and thanks for sharing. ◆

*Left page anti-clockwise from top left: In wall bookshelves make use of the otherwise wasted space of internal walls in the dining room area. The small ensuite features big storage, with a vanity cupboard built into the wall. The space above the bed does double duty for storing more books.*

*This page anti-clockwise from top left: The through-wall wood box is filled under cover outside. Once full, it is pushed into the storage space within a kitchen cupboard. When wood is required for the wood burner, it is a simple task to open the cupboard door and pull the wood box out.*

# Our log home journey

Toni Strawbridge

## From dream to reality

Brook and I started our dream build 19 months ago; a 440m$^2$, four bedroom, two living room and three bathroom log home. As it was so big, Graeme Mould of Natural Log Homes (NLH) suggested we build it in his yard as a test run for his Build Your Own concept. So we bought a caravan and moved to Geraldine with two young children.

We got to Geraldine in May 2018, then went back home to Palmerston North for November and December to start the footings. We returned to Geraldine to finish our house, disassembled it and packed it up in three containers in May 2019, and raced them home back up North.

*This page anti-clockwise from top left: These flat chisel ends are where the bi-fold kitchen windows are going. Build Your Own progresses in the Natural Log Homes yard.*

*Opposite page clockwise from top: The overall house size is now evident. Toni makes sure she is highly visible on site! Brook started cutting out windows and door openings. Perfectly imperfect! First floor joists going in.*

## Reassembly

Our rusty crane unloaded all the containers and we started reassembling our house. It was wet and muddy; we ended up borrowing a tractor to pull us through the mud. Then with three rounds left to go, the clutch plate in the crane shattered and we were stuck. Thankfully the person who lent us the tractor happened to have a crane truck we could use to finish off the wall assembly!

## A fun ride

Brook worked full time on the house in the yard, with a hand every now and then from me and the NLH team. We also had a French intern 'Frenchie' help out for two months and a Czech Republic guy 'Petr' for a few weeks when he stayed on after the 2019 log building course.

It seems so easy to write how this is all going and how it looks like it's all going well, but it hasn't been without its hiccups, that's for sure. What with the council taking eight months to give us our consent, plus the cost and hoops we had to jump through to get it, our steel arriving late, Brook getting lots of other jobs so that nothing was happening on our house, the crane breaking apart, trouble with getting a mortgage and then finding out I had melanoma, it's definitely been a fun ride.

Brook and I are building this house ourselves. We are even milling all the macrocarpa and Sydney blue gum (*Eucalyptus saligna*) on Brook's family farm for our exposed rafters and flooring. We are doing the kitchen and all our doors ourselves as well. Brook is a qualified builder gone furniture maker and I am an experienced hammer hand! Together we make a fantastic team and we are so thrilled we are finally building our dream home together on the family farm. ◆

Check us out on Facebook for all the latest updates.
**Log Home Dream To Reality @loghomedream**

- ***Natural Log Homes***
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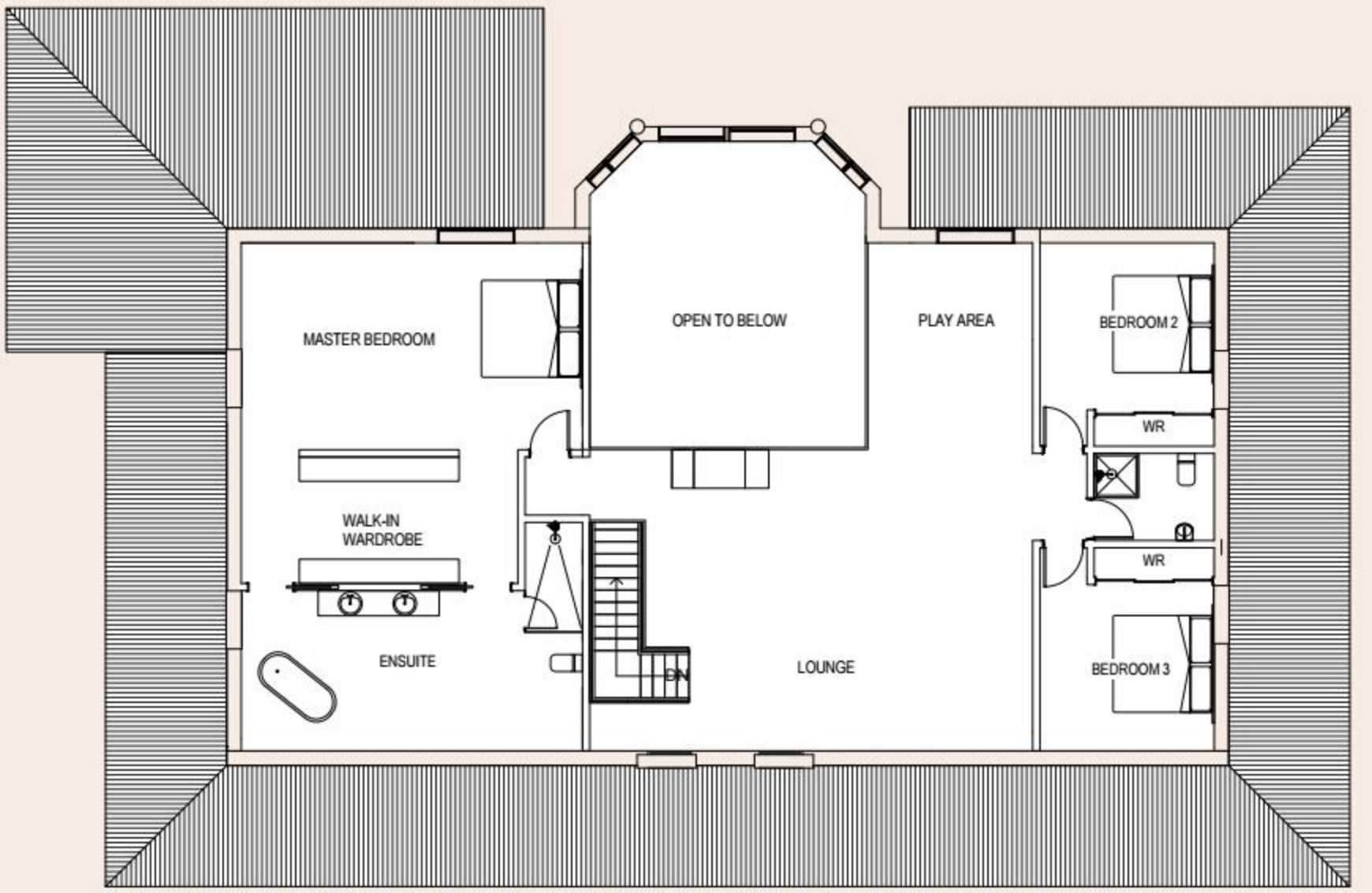
  **03 693 7468, www.naturalloghomes.co.nz**

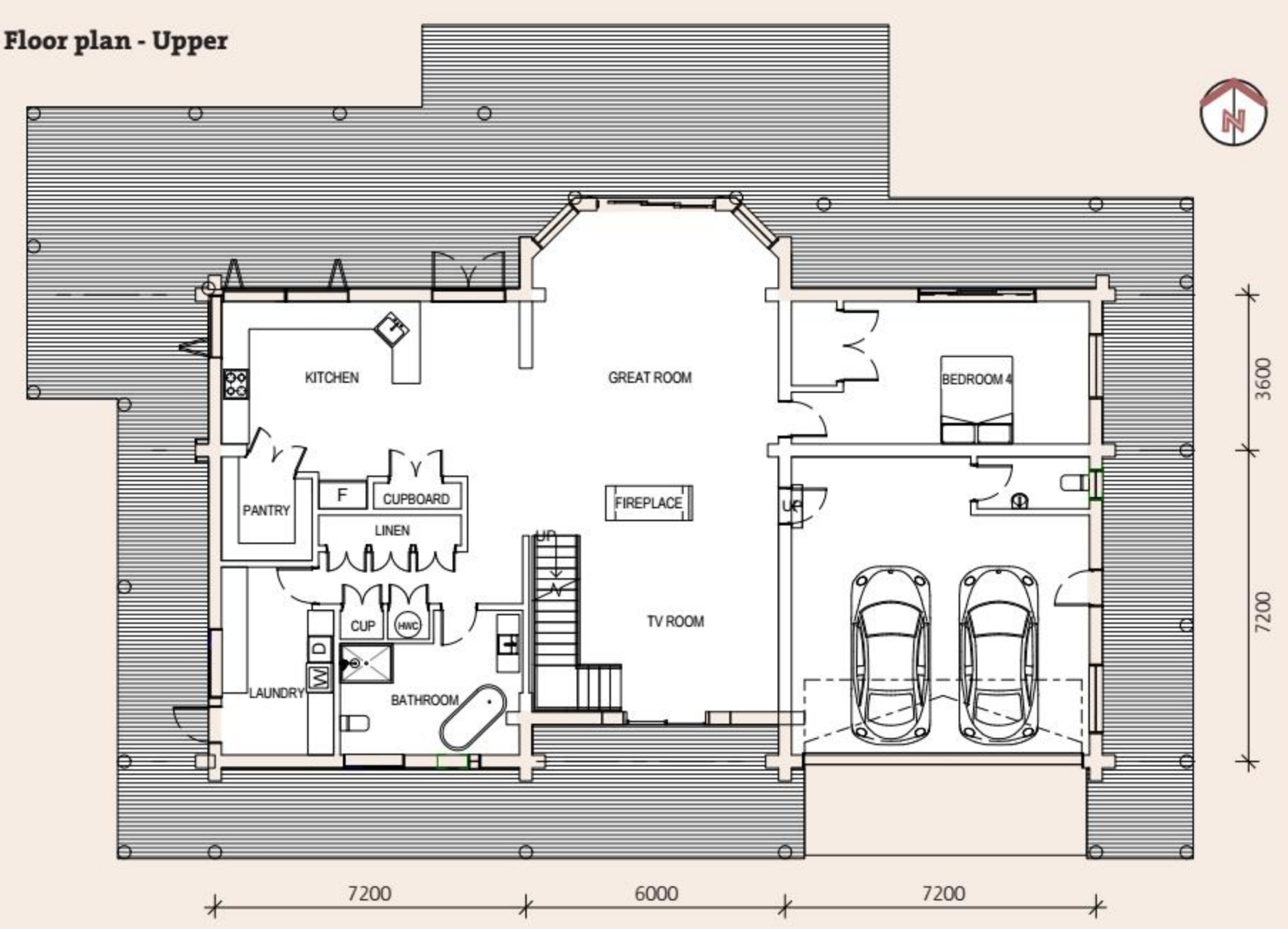
- ***Dalton Design***
  Lloyd Dalton. 40 years' experience in log home design in NZ and Japan.
  **parawai@xtra.co.nz, 027 332 5027**

*Opposite page anti-clockwise from top left: Hand digging pile holes. Ready for engineer and council inspections – block and garage floor pre-pour and the piles. Garage floor pour complete. Floor framing. Container load of logs – our home!*

*This page clockwise from top left: Trusses going up. No ordinary corners here. Craning a first floor log in place. Level by level, it slowly grows. First floor structure. Putting in the rubber gaskets.*




**Floor plan - Upper**




**Floor plan - Ground**

PLANS: DALTON DESIGN

# *Timeline*

BY MARIAN GANZEVELD

The Strawbridge's, a young couple with an infant son, joined the LBANZ in 2015. They were very excited and determined to build their dream log home. Here is a summary of the ups and downs of their log home journey as the story progressed.

**March-May 2017**

In their search for logs, they came across a family willing to sell them an entire plantation forest of mature mixed exotic trees. They intended to use the logs for the frame of the house and extra wood would become the internal fittings. By this time Brook and Toni had added a daughter to the family.

**June-August 2017**

Reality struck when they determined that the cost of getting the forest trees to their property was prohibitive. They would have to look closer to home. Meanwhile the architect and engineer were busy producing the plans for the home. It was going to be a very large house.

**September-November 2017**

In order for this dream to proceed, the Strawbridge's needed to sell their existing house. They did! The family packed up and moved to their building site situated on Brook's family farm. The building footprint was staked. Yes, it would be big home! The building permit was being processed at council.

**December-February 2018**

Brook attended and completed the LBANZ building course. Now aware of what this project would entail, the family decided to be the first to test the new Build Your Own (BYO) concept at Natural Log Homes. Brook would build his home at the NLH yard, renting equipment and help only when needed.

**March-May 2018**

They bought a vintage caravan and shifted the family of four to Geraldine, planning to camp out for six months over a South Canterbury winter with two small children. Brook worked six days a week, taking Sunday off to look after the children. That was when Toni spent the day debarking and sanding logs. There was still no sign of a building permit.

**June-August 2018**

Three months passed and the house was progressing well. That could not be said for the building permit. Their engineer, architect and themselves were all getting frustrated with the information council was demanding. Council assured them it was the normal process, but that did not make it easier.

**September-November 2018**

Finally, their building permit was issued. The log shell was completed to the tenth and final round. They had miscalculated the time needed because they did not include making the roof structure, so they would have to return to Geraldine in the new year. But after a brief holiday they returned to the building site to start the footings.

**December-February 2019**

The footings were done despite a delayed shipment of steel, which made them miss an important inspection, which led to missing the scheduled concrete pour. This happened just before the country shut down for Christmas, so they spent some forced time off at the beach. In the end, they managed to get right back on schedule with hard work and a lot of help from friends, family and strangers.

On top of all the construction stresses, Toni finally convinced her doctor to remove a mole on her arm, on Christmas Eve. New Year's Eve brought a diagnosis of melanoma, which was completely excised two weeks later. The surgery prevented her from helping with the rushed footing completion, much to her chagrin.

**March 2019-current**

The family are back home. The log shell was re-erected during the wet and muddy winter with the help of borrowed equipment. They have built the second storey from timber they have milled themselves. On New Year's Day 2020, the first gable end frame went up.

Like most building projects, the money has not lasted long enough, but this determined couple will certainly find a solution. They always seem to.

# Chainsaws – battery or petrol?

Marian Ganzeveld


PHOTO: GRAEME MOULD, WWW.NATURALLOGHOMES.CO.NZ

Chainsaws play a huge part in creating a log home. No doubt every log home owner has had some experience using a chainsaw. They are extremely useful in the garden too. Consumer NZ recently published a comparison of a petrol chainsaw to a battery driven chainsaw (see link at end for full article). There are benefits for both machines depending on your job. There are also disadvantages.

The battery saw starts and stops instantly so any unintentional cutting is avoided. It is quieter, cleaner and vibrates less so it is much more comfortable to use. It was also found to be better balanced and easier to manoeuvre, a further plus for comfort as well as safety.

## Ease of use

Starting the battery saw requires the squeeze of the trigger; starting a petrol chainsaw is a bit more difficult, especially when cold. Some manufacturers now have an 'easy start' chainsaw which improves that task tremendously. Instead of the operator needing to overcome the engine compression resistance, a drive spring does most of the work.

The battery model has limited working time after which the battery will need to be recharged. This will restrict the amount of work done in one sitting. Keep in mind that no power is consumed when you are not cutting. Having two batteries does help as one can be in use while the other is being charged. But this cannot be done in the bush, away from a power source.

Although the battery chainsaw was found to cut well, it is somewhat less powerful and slower than the petrol version. If you had a lot of cutting to do, the battery saw would take you more time. The testing showed the battery saw would slow down as it struggled to cut through the sample wood whereas the petrol saw did not. The battery driven chainsaw also has limits to the length of guide bar (hence chain) it can handle. Up to a 30cm bar is suitable for a battery motor, but larger bars would need a more powerful petrol engine.

Both machines produce enough noise that you need to wear earmuffs. However, the battery saw is quieter and there is no noise produced when not cutting.

## Maintenance

Both types of chainsaws need to be maintained, but the battery motor requires less maintenance. The petrol engine will need the usual small engine maintenance required for any two-stroke engine. Otherwise both machines need to have the chain tension adjusted by fiddling with screws and bolts. Some newer models now have tool-less adjustments. Both types of machines also need the chain lube oil monitored to keep the chain lubricated. And you will have to sharpen the chains on both.

The battery models are also much more expensive than petrol versions. This is due mostly to the battery cost so having a second battery will greatly increase your layout. If you happened to have other garden tools which use the same battery, then sharing the battery(s) among several tools would help alleviate that cost.

If you were interested in the battery model's features but had less to spend, there is the option of getting an electric chainsaw. But here you have the trailing power cord which can get in the way or get caught. And you can only work a cord's length away from your nearest power point.

Battery


Petrol


PHOTOS: STIHL NEW ZEALAND, WWW.STIHL.CO.NZ

## Safety

When using any chainsaw you need to be vigilant at all times. A moment of inattention can be disastrous. Having used a battery chainsaw, its ease of use makes you forget that it is still a very powerful tool. It is just as capable of causing severe damage as a petrol model.

Transport your chainsaw with its bar cover in place. Carry it by the front handle with the bar to the rear, and not over your shoulder. Turn it off when moving to the next task.

It is best to cut live or recently felled trees. Dead and brittle wood may respond unpredictably causing kickbacks or chain breakages. Always match your chainsaw and bar with the material being cut, do not try to cut a large tree with a small saw. Examine every job carefully and be confident you can manage it and, if not, call in a professional.

Wear protective gear including a safety helmet, earmuffs, face visor, gloves, chaps or safety trousers and safety boots. Keep spectators and pets at a distance.

Have stable footing and do not overreach. Never cut above your head as you cannot control the chainsaw in that position. Consider where the cut wood is going to fall. Also do not cut from a ladder or in a tree. Always have an escape route planned.

Never operate a chainsaw under the influence of drugs or alcohol. If you get tired, stop and take a rest.

## Conclusion

Your choice of chainsaw will depend on what you are going to cut, where that cutting will take place and how good you are with small engine maintenance. The battery saw is great for small, quick jobs and the petrol for felling trees in the bush. Maybe you need both? ◆

## *Sources*

◆ ***Consumer New Zealand***
Commission product tests, investigate issues, advise on consumer rights. Search for 'Stihl chainsaw trial' and 'How to use a chainsaw safely'.

**www.consumer.org.nz**

◆ ***WorkSafe New Zealand***
Promoting accessible information, robust professional advice and effective training. Search for 'Safety with chainsaws'.

**www.worksafe.govt.nz**

◆ ***SawingPros***
Everything you need to know about all the different saws on the market. Search for 'Electric vs. Gas Chainsaws'.

**www.sawingpros.com**

## *Avoiding kickback hazards*

'Kickback is a potential danger whenever you use a chainsaw. You need to know why it occurs and how to reduce it...'
*– WorkSafe NZ*

Kickback occurs when the upper part of the bar tip (the kickback danger zone) contacts a solid object or is pinched. This causes a reactive force that may throw the guide bar in an uncontrolled arc towards you, causing injury.

To the chainsaw operator, the rule about 'not using the kickback danger zone' is like the rule that says 'do not to point a gun at someone...' If you do, and it goes off, the results will be dire!

**How to reduce kickback – Operating techniques**

Using proper operating techniques will invariably reduce the likelihood of kickback. Irrespective of how experienced we are, there are a few well-known techniques and practices that we should always follow and respect:

- Always hold the chainsaw 'firmly' with both hands.
- Ensure your thumb is wrapped firmly under the front handle and in the mitt if fitted.
- Be vigilant – and always aware of the location of the guide bar tip.
- Refrain from using the guide bar tip – don't allow it to make contact with any objects.
- Be especially careful when cutting lighter limbs that can flex and/or catch the chain.
- Do not over-reach or cut above shoulder height – this substantially reduces control!
- Always use extreme caution when re-entering cuts.
- Maintain your chainsaw – importantly the chain brake and other safety devices.
- Make sure that the side-cover bolt is secure and that the nut is properly tightened.
- Use a guide bar that is the correct length.
- Keep the chain sharp and set the depth gauges by using the correct gauge.

*Health and Safety Bulletin 103 November 2016, PF Olsen*

**www.worksafe.govt.nz** *> A-Z topics and industry >Forestry >Industry safety alerts*

# Log home inspiration

Log homes have hundreds of years of history throughout Canada and northern Europe and are well suited to New Zealand's conditions. They are warm, strong, unique and timeless.

## The Log House

This home was built in North America then shipped and re-assembled in New Zealand. It uses a log building style called piece-en-piece where shorter logs are laid horizontally between vertical logs. This is a massive building with three bedrooms, multiple living areas, lofty cathedral ceilings and a soaring stone fireplace.

PHOTO: ERIC

PHOTO: ERIC

PHOTO: MARIAN GANZEVELD

PHOTO: MARIAN GANZEVELD

## Two Island Point

A three-bedroom home (above) overlooking a bay. Due to the remote hilly location, with no delivery road access to the site, the logs were delivered as close to the site as possible before being flown in and assembled by helicopter.

## Lapwing

When the Christchurch earthquakes demolished most of the neighbouring houses, this home (below) stayed in place and in shape, always habitable. A few years later the home was completely restored and redecorated to a high standard. This included amazing landscaping and creating some outdoor living spaces.

PHOTO: JENNA

## Lake Pukaki Lodge

Set in one of the best locations in New Zealand, on the shore of Lake Pukaki, there are amazing views of Mt.Cook from each of the three bedrooms in the house.

The house is open plan and very light inside due to the use of multiple sky lights. It features a log staircase with soaring cathedral ceilings above. Outside is a rustic wooden hot tub where you can admire the view of the lake, or turn your head to view the beauty of the house exterior. This property is available as a luxury holiday home.

**www.lakepukakilodge.co.nz**

## Otago

This house won several awards including the Master Builders Supreme House of the Year, Mid and South Canterbury, 2016. The three bedroom, two storey house features a handcrafted log staircase with full tree trunk newel posts.

What makes this house stand apart from others is the use of red in decorating; the kitchen cabinetry is bright red and the bathroom has a stand alone red tub. Colour is often used in log homes to accentuate the wood tones. Red is especially vibrant and works extremely well in this open plan home.

PHOTOS THIS PAGE: NATURAL LOG HOMES, WWW.NATURALLOGHOMES.CO.NZ

## Woodbury Hunting Lodge

This 800m$^2$ hunting lodge is in South Canterbury. Even though conventionally built, it includes many log features – log floor joists, log trusses and double roof logs spanning up to 12m. 80-year-old locally grown Douglas fir logs were used for the front post and beam structure.

There are four guest suites, all furnished with log furniture. Each suite opens to its own deck. The only upstairs space is a large trophy room. To find out more about this family owned adventure lodge go to:

**www.woodburynz.com**

## Glenorchy

This 11.7x14.7m house was built in 2012 from 40-year-old Douglas fir logs, around 60 in total. Once delivered to site, these logs all needed to be peeled – that took three weeks – and milled.

The home was built by Aspiring Log Homes, a new log builder in Southland, with the help of the owners. The stairs were built upside down, which appears to have worked well.

'The house still needed a set of stairs and I decided to build them upside down, cutting a template out of two 50x300mm timbers then laying the treads onto the template. Then I laid the two stringer logs on top of the treads and scribed them in. This turned out to be a really great way to do it as there was no mucking around involved and all the treads were perfectly placed.'

PHOTOS THIS PAGE: ASPIRING LOG HOMES, WWW.ASPIRINGLOGHOMES.CO.NZ

# Wood and moisture – Not a happy union

Marian Ganzeveld

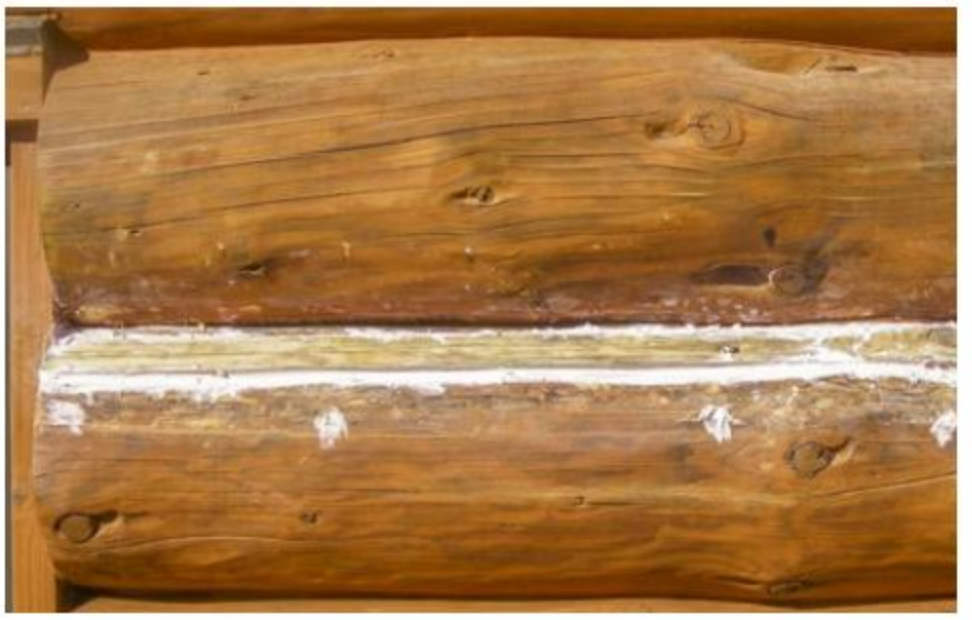
It's pretty simple: wet wood rots. If logs or any exterior wood is consistently exposed to a greater concentration of moisture than the equilibrium moisture content of your microclimate, degradation and rot are highly likely.

If any mould, mildew or algae is found, you need to remove the source, remove the mould and then refinish the wood. Any rot must be replaced with sound wood.

- **Natural Log Homes Finishing Book 2015**
- **www.logbuilding.org**
  > Free Log Home Info > Maintenance and Preservation of Log Homes

*Upfacing check (crack) with signs of rot.*

| LOOK AT | LOOK FOR | SIGNIFICANCE | REPAIR |
|---|---|---|---|
| Exterior log or timber coating or finish | Water beading | Finish is still moisture repellent. | None |
| | Wood darkens as water is absorbed | Finish is no longer repelling water so mould or rot is more likely to develop. | A penetrating oil finish needs to be cleaned and refinished. This type of finish is recommended for exterior log surfaces. A film forming finish will need to be stripped back and then refinished. |
| | Faded stain colour | No longer an adequate sun block, UV light can damage wood fibres. | As above. A darker finish will better prevent UV rays from damaging the wood. |
| | Cracked or peeling film finish | No longer providing enough protection. Moisture can get trapped in behind the finish and cause rot. | Need to completely strip the finish and then re-coat. |
| | Dark staining, discolouration or damp spots | Constant exposure to moisture due to faulty spouting, plants too close to the house, splashing from garden faucets or sprinklers. The darkness is mould. | Remove the source of the moisture. Repair spouting, trim vegetation back to 300 mm from any log surface, repair or improve faucet performance to prevent splashing. Then remove the mould by cleaning and re-coat the surface. |
| | Firewood or furniture is stacked against a wood wall | The wall does not have enough air circulation to dry quickly after rain. Mould and mildew can develop as well as possible insect damage from the firewood. | Remove the items preventing good air circulation. Repair any damage. |



*Decay removed and replaced with sound timber.*

*Treated and refinished.*

| LOOK AT | LOOK FOR | SIGNIFICANCE | REPAIR |
|---|---|---|---|
| Soil near foundation | Soil within 250 mm from wood | Soil will keep the surrounding surfaces damp and encourage insects. Rain can splash soil against logs which can build up and damage the finish. | Prevent any backfilling of soil to the foundation. Use only a clean, soil free product like washed river rock around the foundation. |
| Roof overhangs | Missing | Large roof overhangs are a design feature to protect the logs from rain. | Do not alter your roof line to accommodate a pergola or other uncovered structure. Replace the overhang. |
| Checks (small cracks) | Checks in logs are a natural occurrence and are not significant unless they are large and face upwards | Water can collect in the check, will not be able to drain so the wood will rot. | A small 6mm hole can be drilled through the bottom of the log to allow drainage. As well, you can fill the check with a flexible foam backing rod and caulk. |
| | Previously installed caulk pulling away from the edges | Water can collect in the check and now the remaining caulk is preventing evaporation or drainage, causing rot. | Repair or replace the caulk. |
| Chinking if present | Any chinking that has separated from the wood edge | Water can get behind the chinking and possibly not be able to drain away, causing rot. | Repair or replace the chinking. |
| Test for rot | If rot is suspected, test for soft wood using a fine probe or tap the wood; sound wood will resonate, decayed wood will thud | Rot will destroy the integrity of the wood. | Decay must be removed and replaced with sound wood. The remaining wood must be treated. Remove the cause of the rot. |
| Check for insect damage | Small holes and frass (powdery material) below any hole | Insects bore through wood damaging its structure and appearance. Some insects prefer damp timber. | Treat the insects by injecting insecticide into each hole. If necessary, engage a fumigation firm. |

# logs of laughs

## Supermarket challenge

A man observed a woman in the grocery store with a three year old girl in her trolley. As they passed the cookie section, the girl asked for cookies and the mother told her, 'No.' The little girl immediately began to whine and fuss, and the mother said quietly, 'Now Monica, we just have half the aisles left to go through – don't be upset. It won't be long now.'

Soon they came to the candy aisle and the girl began to shout for candy. When told she couldn't have any, she began to cry. The mother said, 'There, there Monica, don't cry – only two more aisles to go and then we'll be checking out.'

When they got to the checkout stand, the little girl immediately began to clamour for gum and burst into a terrible tantrum upon discovering there'd be no gum purchased. The mother said seriously, 'Monica, we'll be through this checkout stand in five minutes and then you can go home and have a nice nap.'

The man followed them out to the car park and stopped the woman to compliment her. 'I couldn't help noticing how patient you were with little Monica,' he began. The mother replied, 'I'm Monica, my little girl's name is Tammy.'

## On happiness

- The hardest thing to find in life is happiness – money is only hard to find because it gets wasted trying to find happiness.
- The secret to happiness is not to do what makes you happy, it's to be happy doing what you're already doing.

## Ring the doorbell

While out walking, a kindly gentleman noticed a little boy trying to ring the doorbell at a house across the street. The little boy was struggling as he was not quite tall enough to reach the bell.

The man strolled over the street and came up behind the little boy who was still stretching to ring that bell. The gentleman leaned over the boy and firmly pressed the bell. He then crouched down to the boy and asked, 'So young man, now what?'

The little boy grinned and said, 'Now we run!'

## Wise words

- If you rip a hole in a net, there will be fewer holes in it than there were before.
- The letters in the word 'listen' are the same as those in 'silent'.
- A smile is a powerful weapon; you can even break ice with it.
- One hundred years ago everyone had a horse and only the wealthy had cars. Today everyone has cars and only the rich have horses. How the stables have turned.
- Every time you clean something, you make something else dirty.
- Trying to lose a game of rock, paper, scissors is just as hard as trying to win.
- A meaningful silence is always better than meaningless words.
- If you replace the 'w' with a 't' in 'what, where and when', you will get the answers.
- Even a fish can avoid problems by keeping its mouth shut.

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Or email this information to the Secretary at

**secretary@logbuildingnz.org.nz**

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## Welcome!

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LOG BUILDING ASSOCIATION OF NEW ZEALAND INC.

## Contacts

**President**
Justin Long
221 Lees Pakaraka Road, RD6
Masterton 5886
Cell 021 516 637
Email treehutcottage@gmail.com

**Vice President**
Graeme Mould
PO Box 25, Geraldine
Ph/Fax 03 693 8721
Cell 027 221 3812

**Secretary/Treasurer/Editor**
Marian Ganzeveld
PO Box 9052, Annesbrook, Nelson 7044
Ph 03 744 3128
Email secretary@logbuildingnz.org.nz
or
Email noproblem@cogitant.co.nz
for newsletter

## Committee

**Peter Hadley**
Whakatane
Ph 07 312 9069

**Rob Davis**
Twizel
Ph 03 435 0071

**Karen Mc Cosh**
Featherston
Ph 06 308 8453

**Andrew Packer**
Nelson
Ph 03 744 3128

**Alan Baguley**
Whakatane
Ph 07 312 9904

**Doug Sanders**
Geraldine
Ph 03 693 9078

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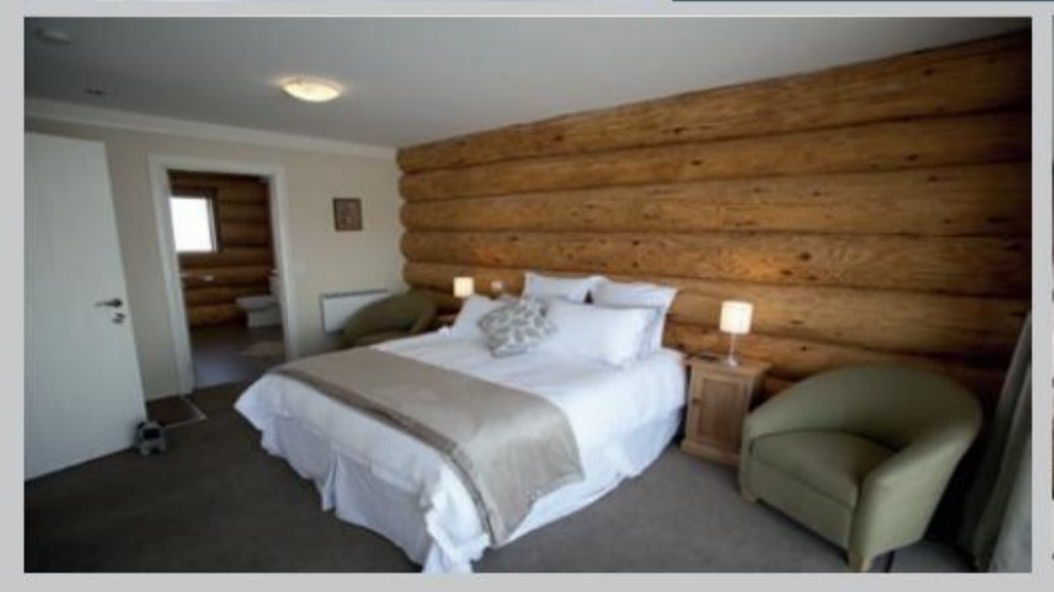

# Treading lightly

*Self-sufficient shed/house*

BY SHARYN MUNRO

Building on the north coast hinterland requires taking account of hot and humid summers, likely to get hotter as global warming impacts. Owner builder couple Andrew and August strongly feel that the latter also requires us to reduce our carbon footprint and change our unsustainable way of living, of consuming power and water.

With those criteria in mind, they have created an affordable and simple living space, self-sufficient in services, using DIY and recycled materials where possible. Although they had built several houses from scratch in the past, and of varying materials, they felt that at past middle age their energies did not run to doing the whole structure themselves.

## Non-OB shed starter

This time they chose to have a steel shed 'shell' erected on a slab, and to take it on from there. The fitout would use the wealth of building material from the old cottage they had demolished on the block. The shed won't burn or rot, and offers a most affordable solution, with the 172m$^2$ structure costing about $70,000 for shed and slab, including final polishing of the latter.

The pair designed the structure online, placing windows and doors, and with one internal wall and access door closing off the eastern bay of the four 6x4m bays. As they will use it for various purposes, including for 'making things', they wanted abundant light from more glass doors and windows than your average shed. There is 96m$^2$ enclosed in the structure and 72m$^2$ of verandah space, on the south for the worst wet weather, and on the west for the hot summer afternoon sun.

The 'flattish' site did not need much excavation to get level; for drainage it was given a slight slope to one side, an agricultural pipe trench was laid and the non-verandah sides were gravelled. On their rural property the shed site is well back from the road and within allowable size limits; as befits a shed, the slab has no drainage or plumbing holes.

The roof and walls went up lined with *Sisalation Foam Cell Shed Liner* – sisalation and insulation combined – and pressed *Zincalume* vermin seal was inserted into the slab/shed edges, also acting as weatherproofing and anti-corrosion barrier.

## Making the most of a slab

Once the team from Stable Sheds and Garages had done the slab, Andrew had another contractor come in and polish the concrete on the section that would ultimately be inside the building. It is much easier to polish edge to edge, so a lot more expensive to do once the shed is up.

A little oxide was added 'to warm up the concrete look', but the finished floor was made more interesting by some additions once the concrete was poured

and had been screeded. The floor includes dark chips from the aggregate in the concrete, but Andrew and August also provided smooth multi-coloured river stones and broken safety glass chips to be broadcast. These random glass chips pick up the light across the finished floor; their surprising origin was a neighbour's stack of glass sheets from old telephone boxes. They 'stuck them in a drum and smashed them', shattering them into small squares. The floor was then floated, and helicoptered.

When the polisher came in, he cut through the top layer and exposed the stones and other additives. In the final process a 'densifier' was added and polished into the concrete, so there was no need for sealing. The shed shell was then erected.

From there these very innovative owner builders took over.

## Power

Deciding on a power supply came first. Andrew had done a weekend course at Rainbow Power Company (RPC) and was keen to use what he had learnt (see *TOB 213 June/July 2019*). Although there is 240V mains power at the older shed by the road, it would cost $7,000 to get it to this new shed and approximately another $5,000 to have the place wired up by an electrician.

For $13,000 Rainbow Power Company supplied a pre-programmed virtual 'plug and play' 24V system, from which Andrew can legally do the wiring himself. This included: 6 x 320W solar roof panels; two Lithium Ion batteries (5KW hours' storage) in a large wardrobe-like case – with space and wiring for two more if needed; a large panel with regulators, inverter, and a twin 240V power point. The battery case is on the verandah but the rest is housed in a pantry-like cupboard in the kitchen. As Andrew puts it, this is 'where the magic happens'. He has hinged the panel provided so he can add or alter as needed, such as a 12V stepdown and switch for his router plus a switch for the house water pump. In here also lives the satellite internet box and the VoIP phone.

In recent fire times in their area, mains power was off for four days as was NBN, but they had solar electricity and satellite internet. They may go off grid altogether now they have seen how well the system works, even allowing Andrew to run power tools from it. So far extra batteries have not been needed; they are mostly only down to 75% overnight and back up to 100% by 9.30 am. next day if sunny.

## Water

Slightly downhill from the shed they installed a 78,000-litre *Pioneer* steel tank, 'luckily just before the last decent rains'. Even in these drier times they have found that runoff from the shed roof is enough to replace what they use. An 'amazing little pump,' a *Seaflo* 24V x 5 piston 70psi diaphragm pump, delivers all the water up to the shed/house – fondly known as the 'shouse'.

Greywater from the washing machine, kitchen and bathroom are piped into a *G-Flow WaterMark* approved filter box; from there it runs down into the paddocks in a series of buried ag pipe drains. They did not need to use the greywater on the orchard and vegie garden up the hill, as they have the dam set up to do that.

## Hot water

Outside on the north they have set up two recycled solar hot water panels. Destined for the tip, their rusted backs had allowed the insulation to get wet. The couple stripped them out, re-insulated, and attached new backs of rescued sheets of fibre cement. They later acquired a 'bombed-out' *Everhot* slow combustion wood stove, and installed

it on the western verandah short wall behind the second-hand stainless steel hot water tank. Andrew pulled the stove apart, replacing fire bricks and mortar; he made a new flue from standard pipe and set about plumbing it for heating water in winter.

As the whole system, hot and cold, is pressurised by the pump on the tank, and not gravity fed at all, there is no difference in pressures of the two heating systems. All are at 70 psi. With the standard hot water tank, all Andrew had to do was remove the old electric heater element and make a fitting to go there for cold water feed-in so he then had enough ports for the rest.

## Outdoor kitchen

I admire the outdoor kitchen setup on the western verandah. Apart from the wood stove, there is a gas BBQ, which Andrew would prefer not to have as he is no fan of the fracking usually needed to extract gas or of the fossil fuel base of LPG. He hopes to replace it with an electrical one in future, power from their own solar system. Along the shed wall is a bench, a salvaged laundry tub that doubles as a sink, the washing machine and the battery storage.

The handsome stainless steel island bench plus storage on wheels is confessed as a 'splurge' from the ubiquitous Bunnings; meant for a workshop tool chest, its wide, heavy duty, soft-lined drawers hold all the kitchen gear. Plus it is so well sealed that no bugs can get in, important outdoors. At $900, it seems a worthwhile splurge to me, since almost everything else is homemade and/or recycled.

The drinks bar is a wooden surfboard Andrew made years ago, set on his old board-shaping stand; rustic, runs of resin all over it – 'in keeping with this place' – Andrew thought.

## Clever outdoor curtains

A major part of this verandah's liveability is the shade cloth sliding screen system, invented by August and Andrew to block out afternoon summer sun. It is typical of their lateral thinking – low tech, low cost – totalling less than $200. Galvanised steel cable runs across top and bottom, along which 'butterfly clip' tabs meant for shade sails, 'cheap as chips', are strung to hold the cream shade cloth. Curtain split rings hook over protruding screws on the uprights and, when unhooked, the 'wall' slides across and is held there by shade cloth tiebacks at the other end. This cream shade cloth offers about 70% block out, while retaining see-through ability.

My eye is taken by the outdoor industrial wall lights. Andrew is pleased to have used these at last as he had been carrying them around for years. Bought at a clearing sale – $5 for a box of 5 – they are of cast aluminium. Perhaps for marine use, as they are completely sealed and waterproof. He has put in 6W LED 24V polycarbonate lamps, which give 600 lumen. Although costing about $20 each, these warm white globes last 50,000 hours.

## Insulation

For an energy-efficient home, insulation is critical and special care was taken here.

### Roof

Below the insulation layer that was installed with the steel roof, there is a 120mm air gap, then *Ceilink* panels. Similar to coolroom panels, these are composed of 50mm expanded polystyrene, with aluminium foil on top and flat *Colorbond* steel as the bottom finished ceiling – no need to paint. Sheets span 6m and are light enough that Andrew says he could have put them up on his own, but with his son's help they did the lot in two days. Panels will freespan over 4m, so partway along is a special bracket that attaches to the purlin above and supports it.

### Walls

Lining internal walls is often an issue. Andrew didn't want to use plasterboard 'because a) it has really high embedded energy and b) I hate doing it and I'm not very good at it'. Plus with the smooth white ceiling panels they didn't want smooth white walls too.

Instead they have used something I'd never struck before: Oriented Strand Board (OSB). Andrew had seen a similar product used as bracing for walls, but composed of bigger chips, yellowish, made from radiata pine chips, meant to be hidden. His searches found their Italian variation, attractive and gently varied in colour, made from poplar tree thinnings, so using what was waste. At 18mm thick, the panels are also good insulation. So their walls have 18mm of OSB, then 100mm of *Earthwool*, then 8mm of the *Foam Cell Shed Liner*, then the corrugated metal.

August sanded the OSB sheets and sealed them with several coats of satin finish low VOC water-based sealer. The sheets are screwed onto the frame, but to join the sheets neatly, Andrew sourced an aluminium T-bar which sits behind the joints. He also sourced aluminium angle strips to hide edges and corners and protect them.

Some of his inventions are for looks as much as practicality. Exposed vertical supports for the shed were ordinary metal C-channels – 'not pretty' – and a place for spiders, so Andrew had steel portal frame covers pressed up and fitted them over the channels. Being galvanised, not *Zincalume*, they have a slight sparkle to them, like the floor.

## Passive solar management

As well as insulation, managing heat entry or loss is important. Curtains are used where needed to exclude radiant heat, even if no sun hits the glass. With the four 24V x 1.5m blade ceiling fans working inside on a 40 degree day, 'it was comfortable', says Andrew.

Outside, for the northern glazed areas, Andrew had what I call 'passive solar awnings' made – *Zincalume* strips with one long edge bent for strength, set at a 34½ degree angle. Supported on standard large braced brackets, with an extra homemade internal support, these cut out sun in summer but allow it in winter. They have now experienced a winter (down to minus 2 degrees) and a summer (up to 40 degrees).

August had cleaned up the cute little *Jotul* wood heater that was in the original cottage and given it several coats of stove black; due to the good house insulation, it proved far more than adequate. Also the polished concrete floor receives the warmth of the winter sun through the northern glass doors and heats up; they close the curtains at night and the heat radiates back.

In this large open living space, apart from the lights beneath the fans, Andrew

has modified standard batten fittings to fix several wall lights, opaque glass balls containing 6W LEDs, operated by RPC pull switch cords.

## Separate spaces

The separated bay is being used as their bedroom, with the bed backing on to a large OSB wardrobe divider, open on the other side to the dressing room. Here I note a set of shelves using narrow OSB leftover strips and also realise that all the aluminium windows have reveals and frames of timber, using floorboards from the demolition, laminated for width where needed.

In between this room and the bathroom is a small space, planned as an office and musical instrument storage – yet to be done.

Andrew framed up the bathroom with rescued 75x50mm hardwood. Clad in OSB on the living side, the inside is lined with what looks like corrugated metal but is actually PVC – white *Cool Top* sheets. Able to be cut with scissors, PVC is waterproof but does not rust from shower condensation. To reduce the latter, Andrew has installed a custom-made exhaust fan into the wall above the shower; it's a high quality 24V computer fan with two plumbing flanges screwed either side. RPC sell the fans as they use them in vents of composting toilets.

## Bathroom surprises

The shower is an impressively compact all-in-one unit, made in China, designed to be retrofitted, that simply sits on the slab and is plumbed through the wall. It incorporates a low bath base and footrest, fixed shower rose and handheld (WaterMark-approved), tap, concealed pipes, shelf, curved sliding glass doors, glass back walls... all for under $500!

The traditional rectangular Japanese soaker tub was made by Andrew from *Paulownia* wood. Entered (after showering) by a small stepladder, you sit in hot or cold water up to the chin – and soak. I can imagine the relaxing bliss...

Andrew also used *Paulownia* to make a handsome 'vanity' for the recycled basin and bench, simply hanging the two shelves on an off-the-shelf racking system. The mirror above the towel rail unit was off an old dressing table; Andrew used spare curtain rods fitted at the ends with knobs off a wardrobe left in the old house. He was one short ... which was perfect as the toilet roll holder.

Equally worthy of note is the simple Humanure Joe Jenkins toilet. Andrew made the box for it from an old computer desk, bought a bucket and a $19 toilet seat. A bucket of green hardwood sawdust sits beside it for alternating with use; there is no smell. He has built much more elaborate composting toilets before; none have worked as well, and all need some elevation. Andrew says that 'this and the solar power are the two revelations of this building' for him. 'We spend so much money getting rid of human excrement!' – and then waste it. Yet 'human waste in a thermolytic compost bin has pathogens killed within 30 minutes and in 12 months you have compost for the garden'.

As the slab has no slope or waste holes, in case of flooding he has made an outlet at the base of the external wall near the bath, with metal angle strips sealing internal wall bases and a small domed strip to be added across the doorway.

## All-electric cooking

Backing up to the galley kitchen divider is an unmissable very large 'distressed' TV/CD unit: found by August on a roadside collection throw out, of crazed black lacquered, but all solid wood. Andrew was partway through sanding it when he decided he liked the look and stopped; they sealed it with clear coats.

The kitchen is a model of compact design. On the divider side is a high bench, for the rescued sink and for Andrew, as 'I do most of the washing up and low benches are bad for my back'. Supported by recycled framing timbers, the top and splashback are of leftover large 'sandstone' tiles from another renovation. They are laid on top of sheets of high density, waterproof particle board which were top and bottom of the OSB pallet load. Beneath this bench at present is one roll-out base holding the *EvaKool* 24V 80-litre chest fridge from RPC; Andrew will make similar rollout units for crockery.

On the outer wall are two louvre-doored (recycled of course) tall cupboards either side of a lower bench for August. This is also the 'electrical bench', where, for example, the coffeemaker, toaster and jug sit, and next to the power cupboard, where the 240V cords come through. The other louvred cupboard is actually a pantry. Beneath the bench are drawers on readymade HD slides. The drawer fronts are sliced-up joined doors from a broken wardrobe, with aluminium T-bar sections holding them together and forming handles. The bottom deep drawers hold all the electrical appliances they now deliberately use – mostly bought from Op shops – slow cooker, frying pan, pie maker, ice cream maker, 5-tier steamer, etc. As they use them in the daytime, it's free power.

Their solar system may seem minimal but it's both sufficient and efficient. All that's needed is to only use two pieces of electrical equipment at once, and to turn things off at the wall.

It's only about one year since Andrew and August started fitting out their shed, but its liveability is already not only obvious, but proven. Estimated total build cost for everything, including rainwater tank, solar power and solar HWS, was about $120,000.

Ingenuity, research, hard work – and the principle of using whatever you have or find– have come together to create this applaudable home. ◆

*Sharyn Munro is an author and regular contributor to The Owner Builder. She lived for decades in her solar powered, owner-built mud brick cabin in the NSW Upper Hunter mountains. Now she lives in the Manning Valley.*

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# Earth building update...

*The Earth Building Association of New Zealand (EBANZ) promotes the art and science of earth construction.*

# Earth Building Standards

We made it!

Funding for the update of the Earth Building Standards has been completed. Thanks to the New Zealand Institute of Architects/Te Kahui Whaihanga, the final payment was made two days before Christmas. We are very grateful to them for this payment, along with other individuals who donated, which followed on from other good news when the Standards Approval Board formally agreed on December 18th to the adoption and publication of:

*NZS 4297:2020 Engineering design of earth buildings,*

*NZS 4298:2020 Materials and construction for earth buildings, and*

*NZS 4299:2020 Earth buildings not requiring specific engineering design.*

This meant the whole team has been able to have a relaxing break after a huge sigh of relief.

## Thank you

Thank you to everyone who participated in developing and fundraising for the updated Earth Building Standards of New Zealand. It was a long journey for the Standards Revision Team, and the largest fundraising campaign EBANZ has done.

Final editing is currently underway by Standards New Zealand (SNZ) in consultation with the Standards Committee prior to publication, which is expected to occur in mid-late January. Once published, the Earth Building Standards will be available from Standard New Zealand. We hope that SNZ will continue to make the digital versions of these standards available at no charge, as with the old standards.

These new standards will support building safe and environmentally sound buildings with earthen materials in this earthquake prone country. They also include guideline sections on light earth building methods and straw bale, which are becoming increasingly popular for their thermal properties and carbon sequestration. We believe that this is a great milestone towards more environmental building in New Zealand.

Thanks again to everyone who has supported this project. ◆

◆ **EBANZ**
Acts as a source of information on natural building methods and techniques and as a network group for those interested in natural building.

*www.earthbuilding.org.nz*

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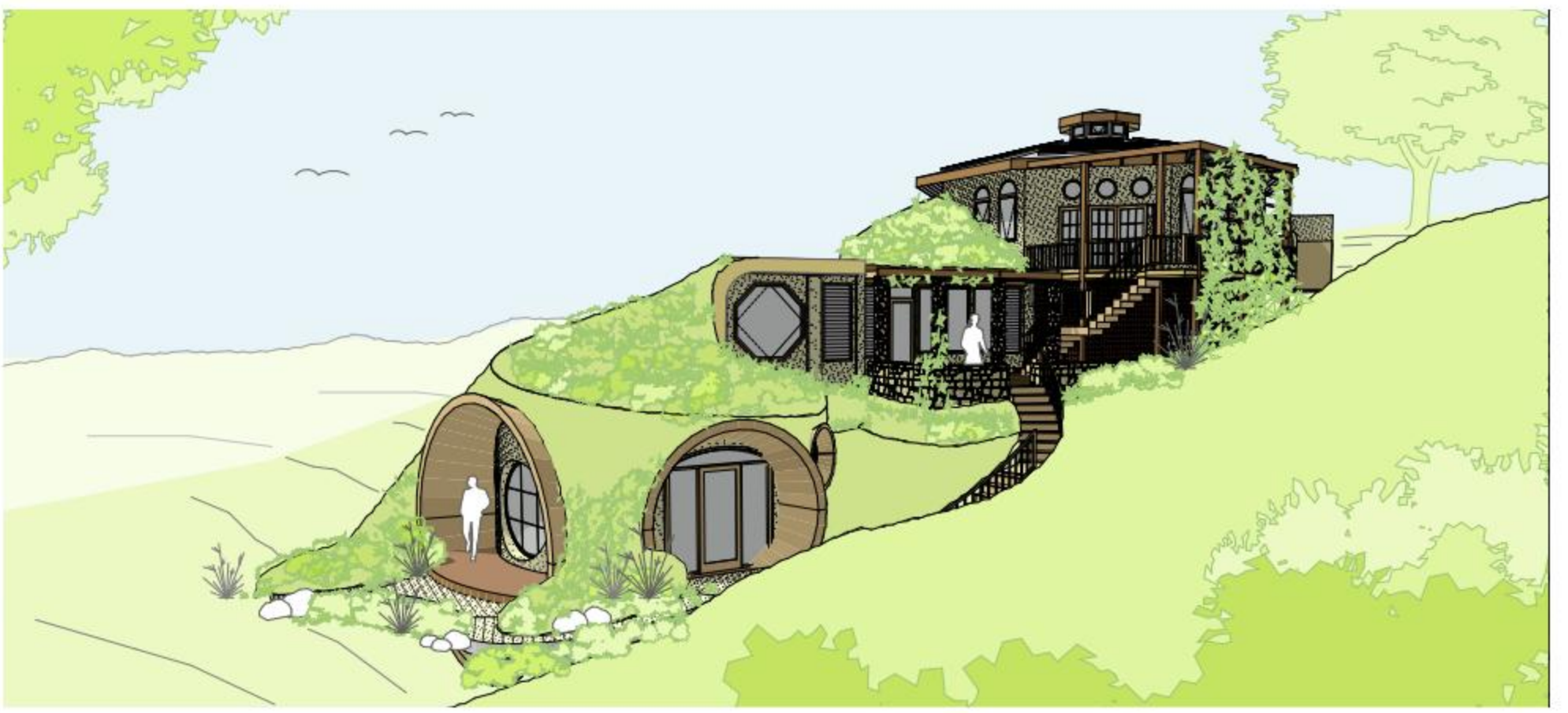
◆ **Standards New Zealand**
Development and publication of standards and related publications.

*www.standards.govt.nz*

# Quirky houses of Narara Ecovillage

BY LINDA SCOTT



Renderings: Integrated Biotecture Design

Houses being built at Narara Ecovillage on the Central Coast range from hempcrete, straw panels, straw bale, rammed and light earth and shortly the first approved earthbag structure in NSW.

William Eastlake, from Integrated Biotecture, has designed two houses that are top of the quirky scale at the village. His clients couldn't be more different, myself Linda Scott (in my 70s) and Benjamin and Carly (in their 30s) from very different backgrounds and life stages, but having in common that they appreciate the unusual, the eccentric, the quirky – and have an appreciation of, and a commitment to, natural building.

Photo: Meng

## Linda's house

I met Will 10 years ago when introduced by founder of the Narara Ecovillage, Lyndall Parris, who asked me if a few visitors could come and stay at my then Avoca Beach house for the weekend! This was before we had purchased the 63 hectare site for the ecovillage, which at that time was owned by the State Government as the Gosford Horticultural Research Station (since 1915). Lyndall and her husband Dave invited prominent permaculturist John Champagne, who brought along graduate architect/ permaculturist Will to inspect the land as the potential ecovillage, which of course it has now become.

They stayed for the weekend. Before leaving, Will said to me: 'I'll design you a better house'. While I loved my Avoca Beach L-shaped house, it was freezing cold in winter and too hot in summer. As a founder member of the ecovillage, before long I sold my house to help purchase the site and I moved into the Heritage House at the newly developing ecovillage. Over time, I developed a conceptual house plan. I had stumbled into a straw bale building demonstration years before while attending a WWOOFer (Willing Workers on Organic Farms) AGM in England, where I met and shared a room with the WWOOF founder, Sue Coppard. I attended several natural building workshops in Europe, as well as Will's 'hands on earth' workshops in Australia, making cob, mud bricks and light straw.

About three years ago I presented my raw concept of house, greenhouse and studio (looking more like a dog's bone) to Will; he and I have been tinkering (and squabbling) with the design since then. Because I chose such a steep narrow block, this has presented many challenges for him and if I knew then what I know now, I probably would have chosen a different lot. However, I just can't visualise my octagon house, with adjoining Earthship-inspired greenhouse and hobbit inspired art studio, covered by a green roof, anywhere else. The 171m$^2$ building is north facing for maximum solar gain. The octagon house is on the higher part of the 666m$^2$ lot. With straw bale, non-loadbearing walls, it will have a bamboo reciprocal roof frame, covered over with light coloured steel.

### Curves everywhere

A curving rammed earth wall connects the three sections, from the carport into the octagon house, down through the greenhouse and past the green vertical garden. Edible plants such as bananas and tomatoes will grow in the greenhouse wicking bed in a year-round tropical climate, in winter venting warmth into the upper living spaces and pumped down into the hobbit art studio (in summer, the air will be cooled by earth buried air tubes).

From there, earthbag tubes will form the solid walls of the pear-shaped art studio featuring a cob carved staircase. A place for my artistic dabblings, weaving, gourd carving, clay sculpture, it'll be a gathering place for local artist friends to help embellish my house with mosaic, clay carving, bottle walls, mandala plaster wall, and more. Before those rewarding activities can commence, we have a long way to go.

There are curves everywhere, though the octagon house straight walls allow fixtures such as kitchen cupboards to be built in more easily. Curves look beautiful but present many more design and construction challenges, and much more time and expense. They continually challenge the budget.

The green roof will extend over most of the structure, helping with temperature control and will be aesthetically pleasing. I'm planning to plant ground cover bamboo with perhaps some golden nugget pumpkins sprawling down the walls. Green roofs can be challenging growing spaces and some experimentation is expected. The combination of rendered surfaces and bermed roof should create much fire resistance but, of course, the hope is that it is never tested.

### Earthworks expenditure

As a hands on designer, Will is playing a major role in the build, working with consulting builder Ryan White to guide the complex earthworks. Ryan has completed a hempcrete house in the ecovillage and he is in demand. When excavator Sean Dibben found Will's plans rather challenging, I asked Ryan to assist in the vital excavation phase. He organised his surveyor to peg out my lot and there will be more survey visits during the build. I have been learning as I go, from others, that a survey or

## Linda's Octagon House


**Floor plan**

Plans: Integrated Biotecture Design

two or three has to be done once the construction certificate is issued, with a comprehensive check on completion that the house is built in the right spot!

The sod has been turned, six retaining wall/landscape tanks with planters installed as well as essential services. The excavation is in several stages and as we approach holiday time, we're doing our best to get an extra survey set out and concrete strip footings completed as soon as possible. Earthworks take a significant dent out of the budget, especially for me, with three levels on a steep block. Sean has been working flat out cutting and filling and we are nowhere near completion (at time of writing). I've put aside a third of my budget for earthworks associated expenditure.

Some of my footings will be built from compressed mud blocks. Others will be from earthbags through workshops run by Hayden Annable of Victorian based Curvatecture. Hayden has completed some major adobe building projects using earthbags, including Willowend Roundhouse in Victoria.

I'm installing the mud floors even before the walls go up. I was inspired to do this by attending a course in England with Athena Steen of The Canelo Project (famous for the book *The Straw Bale House*, plus workshops in clay, lime plasters, sculptural wall carvings and earthen floors). I learnt from Athena how it makes sense to have the earth floors laid and completed up to under the final earth coat so that the floor is well compacted over the 12 months or more it takes to finish the rest of the house. Then the top coat is applied and left to dry and cure, finally sealed by six or seven coats of linseed oil and finally beeswax.

After purchasing a pallet of orange and red oxides from a cement paving company that was closing down on the Central Coast, in all probability there will be many shades of those two colours in the mud floors, walls and possibly everywhere else!

### Forever home budget

I have been very naïve about how much the project would cost. I have renovated many properties in Sydney and London, but those projects bear no resemblance to starting from scratch and as an owner builder. Having been to many natural building events, I deluded myself that by running workshops, where participants usually pay for the privilege of attending, a huge saving would be made and maybe I could chop off a couple of thousand dollars per square metre. In the meantime, there was a building boom with prices rising. And the current drought has meant that even quality building straw has gone up significantly in price and may not even be available as hungry farm stock take higher priority (even though straw would normally not be used as fodder). Other materials, sand, clay, road base will be cheaper to buy and I'll need lots of it. At the village we are sharing tools and machinery, experiences and recommendations for tradies.

Photo: Meng

So, while I've got a target budget, the phrase 'how long is a piece of string' comes to mind. Every Grand Design programme I've watched goes over budget and I don't expect I'll be any different. In my previous dabblings in Sydney and London, I've always been careful not to overcapitalize and not be self-indulgent. I always had in the back of my mind the profile of who would buy my renovated property. In this case, I will probably be overcapitalizing, being self-indulgent, with my own profile in the forefront of my forever home!

I never believed any mainstream builder would touch my project, it being quirky, using natural materials, different systems and non-standard products. I'll make savings and shortcuts wherever I can and try to speed up some of the labour intensive work by 'automation'.

## Benjamin and Carly's house

Benjamin grew up in Sydney, and met Carly in a London pub. She was from Buckinghamshire and studying at the time. Together they stayed in London for 12 more years, and had two children born at home.

Most of those winters Benjamin wanted to return to Australia, but what finally prompted them to come back was hearing about Narara Ecovillage. Three weeks after finding out about it, they flew over, leaving eight pounds in their bank account; they visited the ecovillage, met the people, loved it and signed up. Five months later they arrived back on the Central Coast and began conceptualising the house they wanted to build. Benjamin said: 'We liked the idea of a rounded building, having softer edges and a nice flow; a healthy home in which to bring our family up in and to grow old'.

Their lot is also sloping and naturally presents some challenges. 'We wanted the house to fit into the landscape and be orientated with solar passive principles in mind' Carly said. 'We had some beer coaster sketches, but we never showed them to Will! We're glad because the design he came up with gave an artistic edge to what we wanted', added Benjamin.

### Mud tower

The house is entirely curved and will have recycled and handmade doors and windows. The mud tower at the entry is central to the main house. The tower is essentially a thermal chimney, creating

a thermosyphon effect which will help to draw cool air in from the earth air tubes and lower windows, encouraging air circulation. The mudroom/laundry is at the base, with a spiral staircase that goes up to a bathroom at the top. Says Benjamin: 'It'll be a nice spot for a bath, though not too many as we plan to not connect to the potable water network and we aim to be sustained by rainwater only'.

## Natural building

Natural building was something they'd known about for a long time, especially as Carly had been living in an English village that had many ancient cob houses. Benjamin said: 'I was also influenced by the vernacular architecture of the historic Stroud Valley in The Cotswolds; in Rudolf Steiner's building principles (organic and functional); I also visited the Brighton Earthship which influenced and excited me'.

He continued: 'Inspired by *The Hand Sculptured House*, we were initially thinking of building in cob, but since then have become convinced that the light straw method, with its insulative properties and ease of building, was the way to go. The thermal mass will warm our house through earth floors and wattle and daub internal walls. The house will have earth tubes for cross ventilation and a roof of *Zincalume*'.

Their 155m$^2$ house, comprising of a main house and a granny flat, is being built in two stages. As an owner builder with a lot to learn, Ben feels well supported by people in the ecovillage. Will has spent two days a week helping to build footings from the compressed earth blocks made by an ecovillage startup company Mudtec Pty Ltd using local materials. Ben says, 'Without a trade, I am ineligible for building loans. We don't have the finance to complete the project, so I plan to build the granny flat first, then we'll move in and I'll complete the rest as we'll be able to divert the rent money into our build budget. The round shaped granny flat will be available for family and friends to stay in eventually'.

## Shared vision

When dreaming of a natural building project, it's not easy to find both an architect and an engineer who share the same visions and ideals on sustainable building and living. There seems to be a great divide between mainstream and natural building. Luckily WA engineer Bec Barton of Verdant Engineering is a perfect fit for both these projects. Bec supports and encourages beautifully designed natural buildings for healthy living and wellbeing for ourselves and the environment. She says: 'Sustainably built houses meet the needs of their occupants while being responsive to their natural surroundings. They incorporate many design considerations such as passive design elements of solar and cross ventilation, thermal mass, insulation, embodied energy, water management and energy use'.

Bec is also committed to the principles of community living and has been involved in Green Swing and Deco Housing in Western Australia. 'For a few years, I was part of the Green Weavers who were dedicated to promoting and enabling sustainable communities'. She is looking forward to visiting Narara Ecovillage to check on the engineering progress of her two clients. ◆

***Linda and Benjamin are organising workshops for their house builds throughout 2020. There'll be earthbag and straw bale wall raising, earth floors, light straw, wattle and daub, as well as rendering and plastering with natural materials. If you would like to be notified about workshops, Narara Ecovillage events, staying at the village and learning as a volunteer, please email Linda: ecovillageliving@gmail.com***

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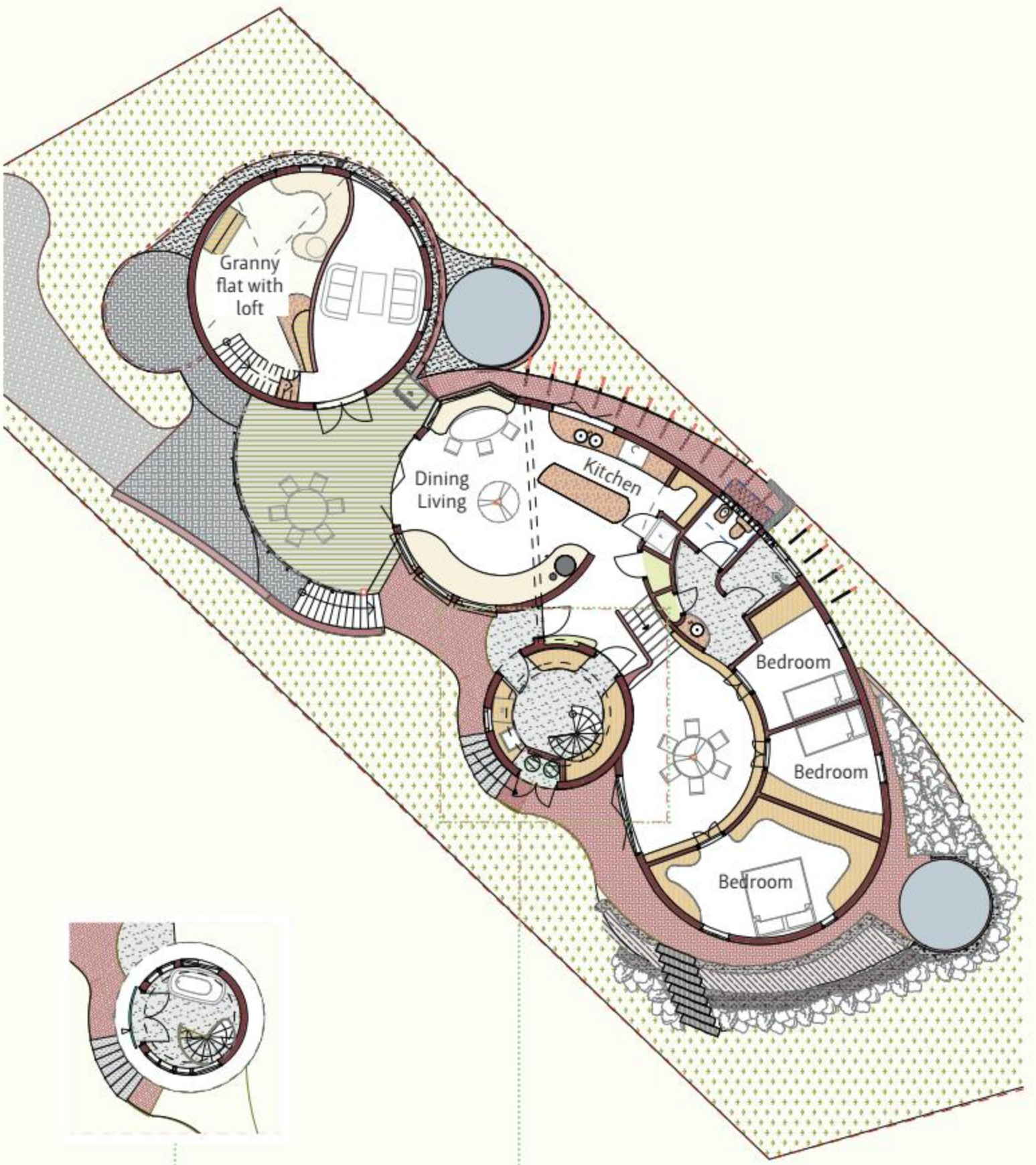
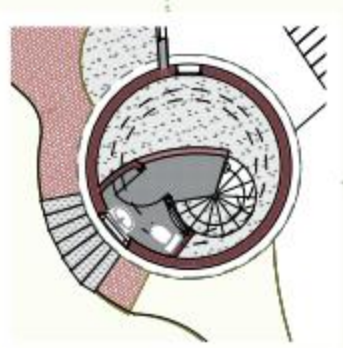
Photo: Richard Cassels

## Benjamin and Carly's House





**Floor plan**

Plans: Integrated Biotecture Design

# Water leak in a rammed earth wall

BY TIM HAMER

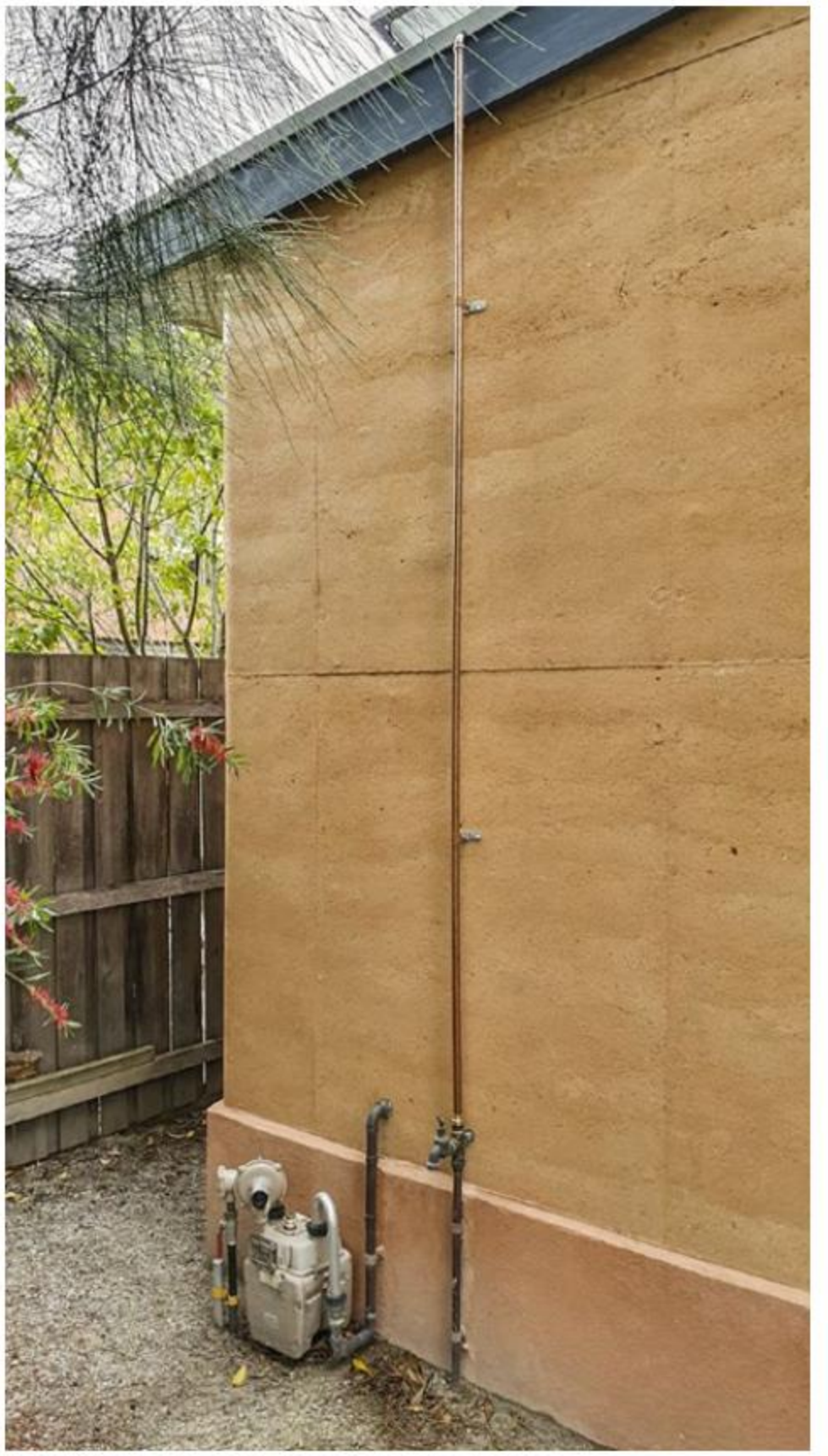
Recently we discovered a significant water stain on the inside wall of our built-in wardrobe. There was an identical stain on the outside wall of the 300mm thick cement stabilised rammed earth wall. It was either sudden rain incursion or a broken water pipe.

The fascia flashing was removed, and two thirds of the last roofing sheet and sarking was lifted. The culprit was the brazed copper elbow at the end of the main cold water supply point where it emerged from the top of the rammed earth wall.

The roof sheet had been laid virtually in contact with the elbow, and had finally caused the joint to fail just below the top of the wall – 19 years later. The main gas supply line is located to the left of the damaged water pipe – luckily, it was ok.

The plumber cut the elbow off and re-plumbed the pipe so it ran up the outside of the wall instead of the inside. The previous entry point was behind the outside tap. This point was then plugged to prevent creatures moving into the redundant pipe. The roof sheet, sarking and slightly adjusted flashing was then reinstalled.

A few days later the wall had dried out. .Problem solved. ◆



# Freedom of simplicity

BYTANIA

The idea to build a tiny house came towards the end of 2016. This was followed by LOTS of research and then the decision that I was REALLY going to do it. It became real for me when I put a deposit down on my tiny house trailer (and I also purchased some jack stands so that I had something for the house in my possession). Next I found a builder, Avi Pelled, who was happy for me to participate in the build. This is a big deal. Then there was more planning and research... and then waiting. So much waiting. By November 2017 it finally began. My trailer arrived!

## Inspired research

Firstly, I thought about how I like to use my living space. For example I like places where I can relax, so I made sure I had a decent living/lounging area in my tiny house. I was also clear that I didn't want the bathroom next to the kitchen. Other than that, everything else was still to be decided.

Then my research went online. I avoided Pinterest because it was way too overwhelming! YouTube was really good for me; just searching 'tiny houses' and seeing what I liked there. My main inspiration was the SHED Tiny House by Robert and Samantha. By this point, I had looked at many designs but when I saw this, I knew it was the one. I purchased their eBook and then I got excited.

I have adapted it to suit my needs and the Australian climate but I wanted to keep the simplicity and elegance of their design. It is important to mention that American tiny houses can be built much heavier than those in Australia, so this needs to be considered when choosing a design and the types of materials to be used. Weight becomes as precious as money in a tiny house build.

## First compromise

The moment my trailer arrived was pivotal! I got mine from Lisa and Darren at Tiny Houses Australia. They are leading the charge when it comes to the tiny house movement in Australia and they provided me with so much information and support. This beauty is 8x2.4m, to conform with the Road Transport Act, and cost $9000. The trailer is constructed specifically for tiny houses to be built on. This was important because it is one of the criteria for insurance and I wanted to be able to insure my home.

I had decided on the structural elements of the frame being in steel, which was carried out by Mullumbimby Engineering, with timber to be used for the remaining infill sections of framing. The trailer was delivered to their workshop, where they welded the frame in place, resulting in a very structurally sound construction. I had a Structural Engineer come look at the tiny house at this point and he provided me with a certificate to say it was structurally sound (also good for insurance).

Initially, there was an overhanging loft on the back (see photo above). After conversations with the Road Transport Authority, I realised that the tiny cannot be towed legally with that in place, meaning I wouldn't be able to register it or transport it, even with an Unregistered Vehicle Permit (UVP). What's the point of building a house on a trailer if I can't tow it! It was a heart breaking decision to remove it, as I loved that loft.

## Framed!

Simultaneously the most exciting and most scary moment at this point was moving the trailer with the frame to the building site. So now on the build site we were ready to go!

First up was installing the floor. Then onto the roof: flashing, bracing and foil backed insulation – really important with a metal roof as it helps prevent condensation and damp walls – and finally the *Colorbond* metal sheets.

As I'd lost the overhanging sleeping loft, I reverted to the idea of an internal one, above the kitchen area. It is a large and spacious area – I can almost stand in it – and the two windows offer plenty of ventilation.

Next the windows went in. These are aluminium framed single glazed units, being a mix of custom and standard sizes. It was much easier than I had imagined. As we had built most of the timber window frames already we 'adjusted' the windows with an angle grinder. Voila! A perfect fit. The back door (from the kitchen) was sourced through eBay, and the French doors through Gumtree.

Sisilation and *Colorbond* external wall cladding followed, laid horizontally. I found the exterior cladding one of the hardest jobs... two people, 8m lengths of *Colorbond*, heights, angles, no patching, Australian sun! You get the picture.

The outside of the kitchen is clad with timber, which made the installation of the window and back door easier, as well as providing some visual variety.

With a tiny house, using every bit of space is paramount. Decking boards on each side of the draw bar create a small space for gas bottles to sit on. Or for a plant to sit on. Or for me to sit on It's already multifunctional!

## Fitted out

Once lockup was achieved, attention shifted inwards. It was an incredible feeling to walk through the tiny house deciding where the light switches and power points were going to go. Electrics and plumbing followed.

Before we clad the walls, I wrote LOVE in each corner of my tiny house and by each side of the entrance. Strange you may say. But now I know my home will always be filled with love and it really is.

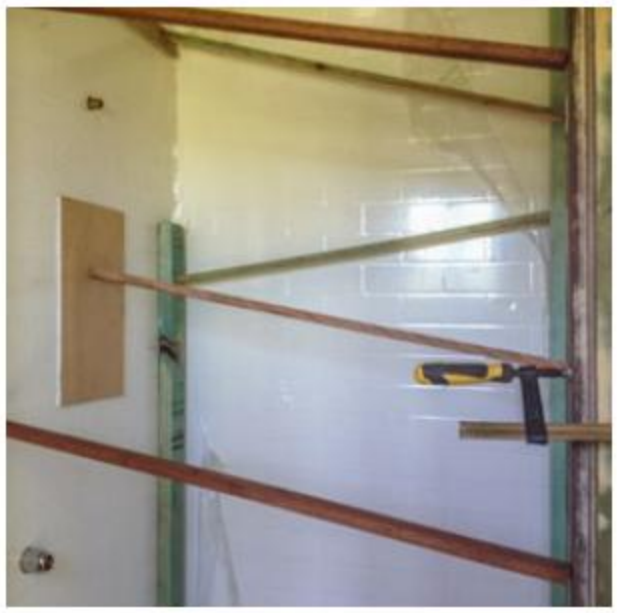
The bathroom was separated off with an internal timber framed wall, including a cavity door. The shower base and glass screen are standard house ones, so the shower is a good size. I sourced both from eBay online. The walls are lined with acrylic panels that look like subway tiles; it took some creative use of props to keep them in place while the glue dried!

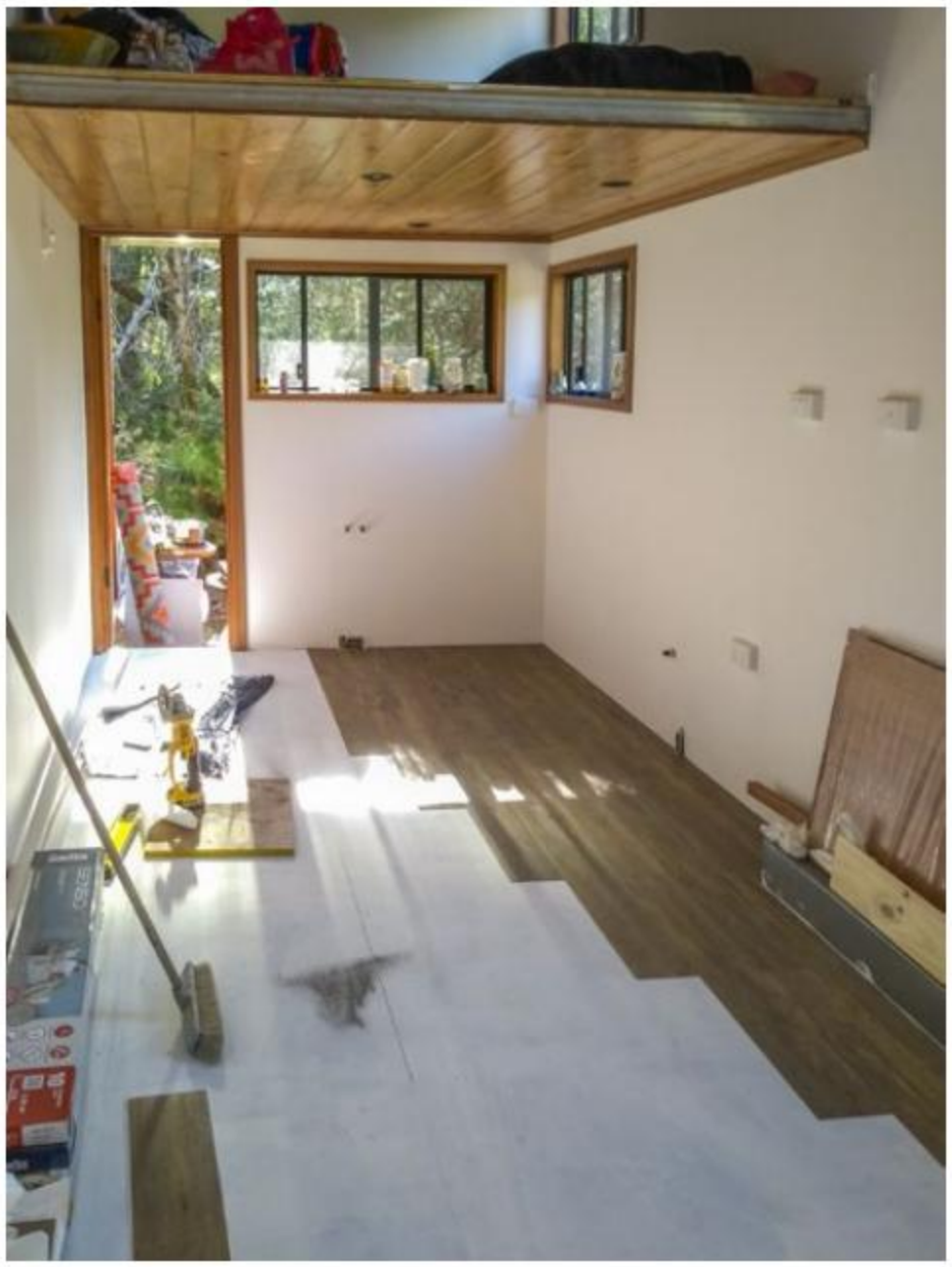
*Earthwool* insulation was used in the walls. For a bit of a laugh, I posted a photo of Chewbacca alongside the insulation photo, with the comment 'Pretty sure I have just insulated my tiny house with Wookiee fur'. Earthwool Insulations Australia came right back with 'we can confirm Chewbacca wasn't harmed in the making of our glasswool insulation!' One mistake I made was to not insulate the floor. I will be retrofitting some rigid foam insulation before I spend a winter in the house.

The walls were lined with ply, then taped, filled, sanded and painted. While the ply is heavier than plasterboard, it is more robust and provides additional bracing. Who would have thought that choosing a 'shade' of white paint could be so difficult? I settled for Antique White as I wanted a warm white. Pine lining boards were used on the ceiling. Trim around the windows and cornice sections tidied the look up.

## Moving on

Well, at this stage, I was served a curveball... I had to find a new location to continue building. This would test the



trailability of the Tiny, for sure! It was a terrifying adventure but one that actually went really smoothly. She is a solid beast and she moves really well! No damage, no cracks, nothing. Bruno, the tow truck driver, is a legend!

The loft and floors were covered with *Senso Rustic* vinyl 'timber' planks, 914x152x2mm, standard stock from Bunnings. I became very familiar with the layout of my local store.

The kitchen is compact but very functional, with handy pull-out shelves including one that provides an additional work surface when needed. . When on site, I use a gas camp stove for cooking. There will eventually be a standalone gas cooker/oven and a fridge.

Because this is not the final resting place for my Tiny, I am not making any 'permanent' connections to the land. The decks are pallets covered with outdoor mats and the shelter over the doors is removable. I use a small camping solar panel setup with a storage battery, along with a backup generator, to power a few lights and my laptop.

The *Air Head* composting toilet was a great find; it has been installed but is not yet vented so not in use. The greywater plumbing has not been completed, so the shower is temporarily acting as a storage space! Water is carted in; the water tank won't be connected until I settle. I love how this has helped enhance my appreciation of the simple things in my everyday life, like having running water at the turn of a tap.

## Enjoying the lifestyle

Being aware of the potential issue of too much weight when moving, I have made sure that much of the construction is removable; the stairs are in sections, as is the kitchen. Finishing off is progressing slowly, mostly due to funds, and I have been away for a while. However, this has also given me time to just be with the house and think about what I really want. The design has simplified along the way. Outstanding tasks include: finishing off the storage in the stairs, a railing for the loft, trims and plumbing.

I am very impressed with how cool my tiny house stays in the heat. With the windows open and one small desk fan running, it stays comfortable. I am very grateful for my insulation! I get to spend weekends and holidays enjoying the 'Tiny House Lifestyle', and look forward to the day that I can move her onto my own piece of land and live in her fulltime. ◆

## Down to Earth

I didn't do all the construction on my own – it was me and a very patient builder, Avi Pelled (Down to Earth). He had my back from the moment I called him saying I had just purchased a trailer and I needed someone to help me build a house on it. He made it real and possible. Not only that, he put so much love, care and precision into the build you would think it was his own.

Let me mention his patience again. Construction was new to me and I was learning as we went along so the days went like this 'Avi, what's this for? Avi, why are we using those screws? Avi, what does this tool do? Avi, can I have a go?' I also got to play with a lot of tools; using a drop saw for the first time was a major milestone! Working together everyday, we were either going to love each other or hate each other. I'm happy to say we love each other. I have made a friend for life.

Being able to participate in the build has deepened my appreciation and love for the house. I often just sit and look at her and reflect on the journey I have had. It has been one hell of a ride so far and I will remember this (continuing) experience for the rest of my life.

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RIDGE RYDER

# Rammed earth workshop

*So much reward for such a relatively small amount of time!*

BY ALISON DONOGHUE

My husband, Simon, and I are lucky that our son, as a fourth-year engineering student with a passion for sustainable building materials, was only too happy to indulge his parents' aesthetic attraction to rammed earth.

He based his final year thesis on the relationship of particle size distribution in soils to the compressive and flexural strength of rammed earth. His exploration led him to an area of soil on our 30-hectare Land for Wildlife property in rural Victoria. Once tested, the soil showed suitability for use in the rammed earth walls we intend to incorporate in a new dwelling Simon and I plan to build in the next year – or so!

## Soil testing

The results from the soil testing showed a near-perfect mix ratio and so our journey into rammed earth began, and to a certain extent, ended. As a chef by trade, I had nothing more than a general idea of the process behind these walls, along the lines of mixing an appropriate soil with 'some' cement and 'some' water and packing (or ramming) it into the formwork. I've looked through magazines, watched Grand Designs and scoured YouTube for more detailed directions of how I would go about doing it myself, but my combined knowledge remained little more than a 'vibe'.

I never considered employing someone else to do it. The process of building these walls ourselves was just as important as the result. A yearning to get my hands dirty and create something with mass and weight and permanence had niggled for many years. I have no interest in leaving a legacy, but if I bequeath a few beautiful earth walls to shelter future generations, then I'll die a happy woman!

## Workshop introduction

Back to the 'how-to'! Our son, once again, provided the solution with an introduction to Peter Jackman from Rammed Earth House in the form of a


weekend workshop. And what a beautiful thing to do with a weekend.

I'm not a fan of a two-day getaway where you wander around new (or even familiar) destinations looking for something to do while digesting your large breakfast. Then you wait for your appetite to return so you can eat too much for lunch. Then sleep this off to make room for a dinner you don't need.

So I was extremely excited to join Peter and Tash and five other students for a weekend of learning and doing amongst the classic Australian surrounds of their rural site near Beechworth.

## Day One

After a quick breakfast on Saturday morning, we drove out of Beechworth, accompanied by the scent of eucalypts and spring grasses, to arrive in Kelly-country and the equally enticing smells of homemade slice and biscuits. A warm welcome and a hot coffee later, we launched into the theory behind rammed earth and the importance of soil selection.

I was itching to get my hands dirty but found myself fascinated by soil and its many components and variations. We sieved samples to separate the subtle but significant differences in gravels, sand, silts and clays. We learned how to do a Sedimentation Jar Test and examined and discussed the resulting percentages. I found the compliance and science of an ancient technique elevated to an architectural specification almost overwhelming in its complexity. But, just in time, we moved outside to make a take-home project reminiscent of a grade one art project and just as much fun.

### Diverse projects

And here the recurring theme of the weekend first emerged; intricacies were raised, considered, addressed and quickly resolved by a return to the simple and effective system that is rammed earth. An introduction to pneumatic rammers stepped up the physical demands as we took turns to control these unique tools. We were relieved to learn that less effort and strength gave more control. Again Peter led us through the options in terms of quality and cost for these essentials, with his own experience saving us all time and money.

As a group, we were as diverse as our projects, with ages ranging from 16 to 60. The others in the group included a builder and his clients looking to construct a family home on the Mornington Peninsula, and a young academic wanting to create a utopia in the coastal bushland of NSW. We were all learners and equally intent on gathering as much detailed information as possible. The diversity of projects raised a variety of questions and reaffirmed the importance of planning and decision making before starting. Our lack of thought around the very basics of what equipment we needed; what formwork was most suitable; what mixing system was best for our needs and what it would all cost, surfaced quickly. Peter reassured us that all would be divulged.

### On site examples

Peter and Tash's build site enticed from a distance. It felt like a prize to which we would only be allowed entry once we had earned the right! And with our pencil-box class project complete and a little more theory under our belts, we were taken on-site. Again, the theory became practical with the results rising high around us. The beauty of Peter and Tash's monolith structures drew us through the design and structural engineering decisions needed for our projects. The prior preparation would be worth it; the prize surrounded us.

As if the day could get no better, a distant coo-ee from Tash signalled lunch was ready. A tough decision was needed – stay gazing and stroking the rammed earth walls around us or leave to satiate a hunger sharpened by fresh air and effort. Of course, we chose the roast chicken, fresh salad, sourdough and smashed avocado!

### Formwork testing

We then spent the afternoon with a theoretical introduction to formwork, followed by our first attempts to build it and then fill it in the name of researching the finer details of lift heights and cement percentages and meeting personal aesthetic preferences. The workshop's thorough research featured again as we gave thought to the construction of our walls at this meticulous level. And this undoubtedly is the real value of Peter and Tash's workshops, as they share all they have learned and encourage others to build walls that take expectations beyond purely structural.

At the end of day one, our excitement was only slightly checked by our information-packed minds and a thirst for a cold beer. But once our hunger and thirst were satisfied, the honest fatigue of a day well spent made sure we enjoyed a sound sleep.

## Day Two

Refreshed and ready to go we all arrived punctually on Sunday morning, eager for more information and hands-on experience. After a Q & A session and discussions around our design challenges, we removed formwork from the previous day's sample blocks. We spent some happy time looking, touching and discussing the consequences of changing cement percentages, water content and lift heights. It struck me as funny and fascinating that we were so absorbed; only the lure of lasagna and salad (again supplied by Tash) drew us away from our earthly contemplations.

### Serious construction

The logic behind Tash's high carb lunch was evident once finished, as we topped up our sunscreen, donned hats, gloves and earplugs to venture up the hill for the afternoon's serious work. Our task was to construct different types of formwork around some previously prepared concrete footings and subsequently add four pillars to a beautifully conceived garden walkway built with varying degrees of success by previous workshop participants.

Of course, our competitive natures surfaced as we divided into two teams and set about putting our theory and small-scale experience to serious construction. We witnessed Peter and Tash's two-person production system as they fired up the tractor, agitator and compressor to begin mixing and delivering our earth. Two hours later,

we stood back and surveyed our efforts. Sun-kissed and sprinkled with dust we had achieved our goal. We were also now armed with the theory, the experience, the cost and an idea of the time and effort needed to build these timeless structures. So much reward for such a relatively small amount of time!

If you are thinking of investing in these magical walls, you need to do a workshop. No amount of reading or YouTubing can deliver the benefits that real life will add to your project. Peter and Tash's thorough and methodical approach provides all the technical knowledge around equipment, soils, cutouts, insulation, wiring, plumbing and design considerations. Fundamentally, however, a Rammed Earth House workshop will demonstrate an elemental, sustainable building technique and reveal its simplicity. At the very least, you will walk away from a fun weekend getaway; thirsty, tired, dirty and rewarded by a wonderful sense of achievement. ◆

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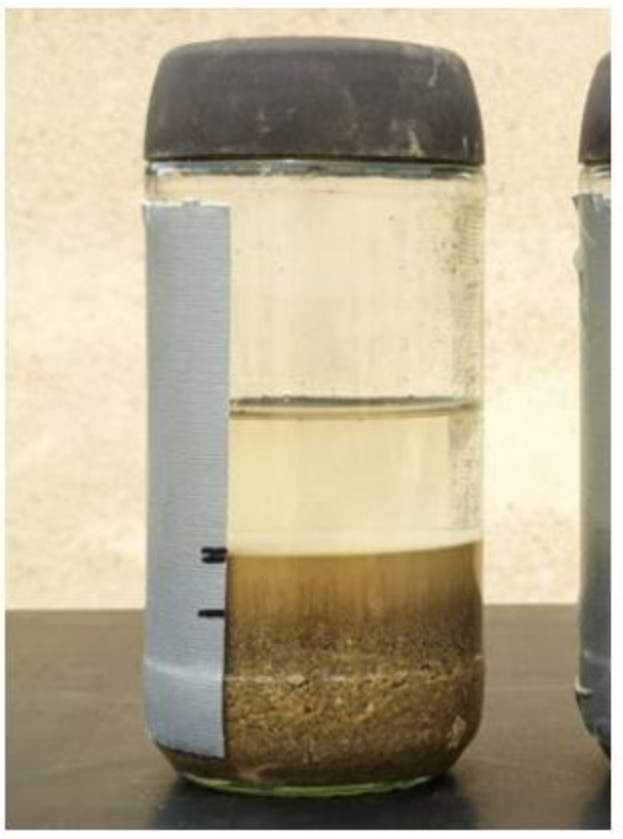

## *Rammed Earth Jar Test*

*By Peter Jackman*

Finding the right soil is critical to the finished quality of your rammed earth build. What you are looking for is a well-graded sub-soil made up of gravel, sand, silt and clay; usually, granite or sandstone, also limestone. You may be lucky and have enough soil on your property for your build. If not, source 20-litre soil samples from local quarries and soil supplies for initial testing before purchasing.

The first thing to establish with your samples is the proportion of coarse particles (the gravel and sand) to fine ones (the silt and clay). For stabilised rammed earth, the proportion you are looking for is 70% gravel/sand and 30% silt/clay (+/- 5%).

The quickest and easiest way to get a rough estimate of the proportions is with a simple jar test.

**Jar Test Procedure**

- Fill one-third of a glass jar with your soil.
- Add water until the jar is two-thirds full.
- Add a pinch of bicarb soda (you can also use salt).
- Seal the lid of the jar.
- Shake thoroughly and leave for 30 minutes.
- Shake again – after 1 minute mark where the gravel and sand settles.
- Leave for 30 minutes – mark where the silt settles.
- Leave for 24 hours – mark where the clay settles.

**Calculations**

- Measure the total depth of soil = T
- Measure the gravel/sand depth = GS
- Measure the silt/clay depth = SC
- Gravel/sand proportion (%) = (GS/T)*100
- Silt/clay proportion (%) = (SC/T)*100

If the jar test result is in the 70%/30% ballpark, then the next step is to take your sample to a soil laboratory to test particle size distribution and Atterberg limits.

**Notes**

Stabilised rammed earth

- 8% to 10% of cement added to the soil mix.

Maximum gravel size

- 9 mm to 13 mm
- Gravel larger than 13 mm can cluster together in the narrow forms, leaving voids and weakening the compacted matrix.

Modifying your soil

- Sand can be added to the soil if the silt/clay proportion is too high.

Atterberg limits for rammed earth

Atterberg limits cover a range of soil tests relating to reactivity to moisture (water), better known as plasticity. These tests include liquid limit, plastic limit, plasticity index and linear shrinkage. Atterberg limits play an important part when classifying soil types and work in conjunction with particle size distribution tests.

- Plasticity index < 15%
- Linear shrinkage < 6%

Soil Testing Laboratory

- Civil Test in Victoria, similar laboratories in each state.

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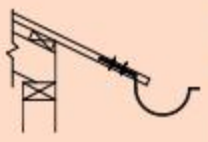

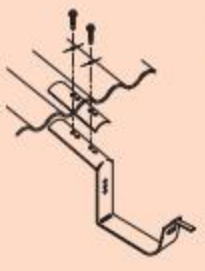

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# Reflections...

## *Earth Building Association of New Zealand Conference*

2-3 November 2019

*Cromwell, Otago*

***www.earthbuilding.org.nz, www.facebook.com/earthbuilding***

*It is a great inspiration to spend a weekend surrounded by people who are working to create earth buildings, and the annual earth building conference was full of these creative and knowledgeable people.*

**BY ELIZABETH GUTHREY AND MIKE FARRELL**

House tours are always a favourite activity for everyone at the conference. The North and South region house tours in central Otago were very different historically and particular to this part of New Zealand. The South tour featured mostly restoration projects, and it was fascinating to see how common smaller houses and earth buildings were for rural settlers in New Zealand. Each owner or restorer was very proud of their earthen house restoration project, be it cob, rammed earth, or stone with lime plaster.

## South tour

### Butler's Farm

The first stop was Butler's Farm, which used to be an orchard on the Alexandra to Dunedin road. Jeremey Moyle of Historic Earth Building Otago gave a talk on the history of Butler's orchard and restoration which consisted of schist buildings with timber framed roofs. This was backed up with a very interesting demonstration on how to make lime putty and how to point the schist to stop the wind from blowing through the building. It was very pleasing to see the time and effort that the owners of the buildings are putting in to save and restore them, possibly as farm stay accommodation or as a conference centre.

*Editor's note: Schist is a metamorphic rock that has been deeply buried, heated and recrystallised, so that it breaks along a preferred direction, usually called gneiss everywhere else but New Zealand.*

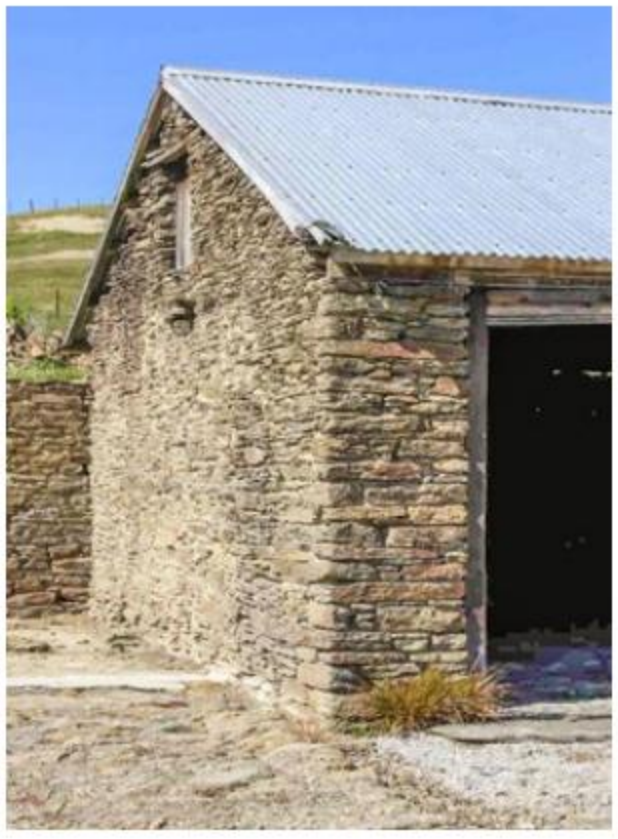

Photo: Tara Cassidy

Photo: Tara Cassidy

## Murphy's Cottage

This late 1800's building (top left) was made of mud brick and earth plaster, and in later years a second fireplace had been added made of schist. Typical of the area and period, Murphy's Cottage consisted of two rooms kitchen/living and bedroom. Imagine bringing up a family in such small quarters!

## Thyme Lane B&B

The newer of the two cottages, built in the 1920s, sits majestically on top of a nob, with the original cottage (bottom left) from the late 1800's behind. The owner told us of how the cottages had been in their family and then sold. In recent times she was able to buy the property and restore them both to their former glory.

The original owners of their building were John and Helen King, and it appears they made their own earth bricks stamped with their name. Later, another owner had covered the houses in cement board cladding. The current owners had pulled this off, lime washed the earth walls then painted it – although an alternative restorative process would have been to add oxide to the lime wash for colour. Hats off to the owners for their dedication in removing the cladding over the mud bricks and lovingly restoring this building. The effort and passion that has been put into the detail is excellent, even down to getting the right coloured clay paint to match the mud bricks.

The newer, front cottage (middle left) had a room that was about 3.5 x 3.5m, which had a kitchen in one corner, a couch in another, a fireplace, and a kitchen table. Apart from this, there was an entrance, a bedroom and a bathroom. We learned that at one time there were four generations living on the property, within this little cottage and the original home, which had undergone numerous extensions. It is pleasing to see buildings of this nature being loved and restored for further generations to admire.

## North tour

### Rippon Winery

Rippon Winery is a grand rammed earth plus post and beam building settled above a magnificent view over Lake Wanaka that has become a very high-end venue for weddings and other functions. The couple always wanted to build an earth building with earth from their site and had in mind a Community Hall. They began by making earth bricks and came across a few challenges with them drying out too quickly. Finally, they settled on rammed earth, 50% from their site, and the rest locally.

The walls have varying ribbons of coloured rammed earth which flowed like the seams of colour in the surrounding hills under differing lights. Naturally, people turn up in high heeled shoes, so in hindsight, they wouldn't have put down an earth floor for the main entrance area. Patching up the holes and resurfacing the floor is a continuous process which they have difficulty managing with the high level of bookings. The main hall has a sprung floor.

Native timbers were used throughout on the lower floor, which is rich and vibrant in colour, adding a warmth to an area without natural light This building is also very well detailed on the exterior, with *Corten* sills and varying angles at the doorways and edges.

Mention must be made of the superb craftsmanship in this building, and the use of gothic cathedral trusses with mortice and tenon joints, then fixed by dowels. From the ornate front entrance door from South America to the sprung floor in the main hall, Rippon Winery has a strong sense of quality and meticulous attention to detail – in keeping with their wine. It is a credit to the owners and the designer.

Photo: Tara Cassidy

## Maungawera Valley

Our next stop was the old telegraph exchange building at Maungawera, which had been stunningly renovated by the present owners. It is of rammed earth and was in a very bad state of repair when purchased. One wall had partially collapsed, there was no floor and a tractor had been stored inside. The restoration work was carried out by a builder as the owner was busy with a film at the time. The workmanship is excellent, and the matching of old with new is seamless.

The renovation involved fully replacing the roof, windows and doors, and some of the walls. Recycled materials were chosen for the kitchen with bold natural timbers and stone that create a great atmosphere for a cottage. Time has been taken to get the earth recipes correct which makes this project even more special. This dwelling had the best smelling toilet due to it being totally lined with timber! The couple decided to fully renovate it close to how it would have been, and then lived in it for four years prior to completing a much larger straw bale house on their property. Considering it was never designed as a home, this little open-plan building made a perfect couple-sized home and is now let short term.

Following this excellent restoration visit we had a brief look at the owner's straw bale property, thanks to its builder, Sven Johnson of Sol Design who happened to be on our bus. This dwelling has a warm feel to it (despite its considerable size) with the soft exterior of the clay lime plaster, and the conservatory made of schist walls and clear roof.

### Hiberna

Back up the road to Luggate, to Ben and Jessica of Hiberna, who explained their design and build philosophy of their nearly completed passive straw bale house (top left and right). This has undergone an air flow test for air infiltration which came out at 0.5, which is very impressive in *Passivhaus* terms. The couple imported high specification windows and a heat recovery ventilation unit from Europe. This building is two storied and is extremely spacious inside, despite having a pretty small footprint. In order to be on site for the duration of construction, Ben and Jessica had previously built a garage cum secondary building of the same material, which looked just as impressive as their home.

The remainder of the day was taken up with a brief visit to a spacious, unfinished straw bale house at Maori Point, which included discussion as to the advantages of pumped plaster.

## Extra visits

The next day some of us were able to go on another tour of Hayes Engineering, which is an amazing facility and a highly recommended visit if you travel to Central Otago. Our guide, Ken Gillespie, told us about the history of the families' building of the homestead (right) using

mud bricks with a clay plaster over them. Experiments are being done on mixes of clay straw and cow manure to find the best recipe for restoration of the stable, dairy and homestead with a mud brick café on site also. Hopefully they will last another hundred years or more.

Our final visit was to the home of author Jillian Sullivan (below), who wrote *A Way Home* about the process and construction of her home – a lovely warm and inviting home with a 'presence' on the land.

## Presentations

Tours were interspersed with a series of presentations and demonstrations, the first being from Jeremy Moyle, then Jackie Gillies on conservation and repair issues. These were two well-presented talks suggesting that the time to start conservation is today, as tomorrow may be too late. New Zealand is a young country and we need to keep these fine old buildings as a reminder to all generations of how things were.

Pat Mawson and Ben Eyers gave a short demonstration showing how long it takes for direct, continuous moisture to penetrate thick layers of lime plaster. Two samples of clay lime plaster that is commonly used for exterior coating were provided, one of which had been frosted. As suspected this sample did not meet the test standards. For the second test the tap was turned on and a small amount of water appeared on the back of the sample. This had to come through the sample. Astonishingly the water quickly dried up and the test continued. How did the water go through then dry up? The simple explanation is that the water molecules reacted with the clay and lime to form bridges which expanded and therefore stopped further water penetrating. It was quite remarkable to see at fast forward speed and under extreme circumstances, that lime plaster proves to be a great protector of straw bale walls.

Verena Maeder gave a riveting presentation on the restoration of Esk Head Station Homestead, which had been badly damaged by the Kaikoura earthquake of October 2016. Verena outlined the damage caused by concrete paths being built against earthen walls, and the dangers of water damage to the foundations – quite apart from the hundreds of holes excavated by the rabbits! This was a presentation full of passion and laughter as is Verena's way and the building now looks as good as when it was first built – if not better.

There were also talks by Paul Jaquin on the engineering of earth buildings, Hugh Morris on plane testing of adobe veneer, and Kieran O'Connell of KOA Design on a recent hempcrete house in Wanaka. Graeme North's presentation and vision of a vibrant, low carbon footprint future for earth building is spot on, and all building projects need to start thinking of this.

The highlight of the conference was the people. It was great to catch up with old friends and to meet like-minded people passionate about earth building. It doesn't matter what type of building you are interested in – straw bale, adobe, mud brick, hemp, rammed earth – everyone supports each other. ◆

***The EBANZ conference 2020 will be held on 31 October -1 November at Kawai Purapura, Albany, New Zealand.***

# *Graeme North honoured*

## ESTEEMED GIFT

A special presentation was made to Graeme North for his lengthy service and incredible contributions to EBANZ. He has dedicated forty plus years to earth building and architecture, including the writing and recent review of the Earth Building Standards. Graeme stepped down from the Chair position last year, but remains on the committee and continues to play a large role in the updating of the standards.

The association took time to contemplate what suitable gift could begin to cover Graeme's distinguished service. A beautiful Maori carving by Nathan Foote was finally selected, and clearly Graeme was moved by the significance of the gift, and the recognition. The Teka, which would be the footrest attachment of a Ko (digging stick), is of Matai timber finished with tung oil and red oxide, and with eyes of Paua.

### Explanation of Graeme's taonga

- The 'front' figure is Rongomaitane, the Atua of Peace and Agriculture.
- The protruding arero (tongue) symbolises the expression of courage to speak one's truth.
- The design on the shoulders is called raperape, it is used here to symbolise action and movement in the physical realm towards a harmonious relationship with Papatuanuku and Ranginui.
- The base has the surface design called mata kupenga. This design symbolises a net and the concept of bringing people together.
- This design can be seen as emanating from Rongomaitane's pito (navel), and in this form, it represents a spring, waiora, life giving water.
- The 'back' represents Ranginui (top) and Papatuanuku.
- Tanemahuta is also there on his back pushing his parents apart to separate them and let the light in.

*taonga*

(noun) treasure, anything prized – considered to be of value including socially or culturally valuable objects, resources, phenomenon, ideas and techniques.

*teka*

(noun) dart, crosspiece (lashed on a pole to make a rough ladder), footpiece (of a ko).

*atua*

(noun) ancestor with continuing influence, god, demon, supernatural being, deity, ghost, object of superstitious regard, strange being.

## THE NEW ZEALAND ORDER OF MERIT

The Queen has been pleased, on the celebration of the New Year 2020, to make the following appointment to The New Zealand Order of Merit:

**NORTH, Mr Graeme Frederick**

**For services to architecture and natural building standards.**

Mr Graeme North is an architect who has been involved in the natural building industry in New Zealand since 1971.

Mr North was the founding Chair of the Earth Building Association of New Zealand (EBANZ) in 1988, a role that he resumed from 2014 to 2018. He developed the original Earth Building Standards published in 1998 and is currently completing an update of the standards.

He uses a wide range of natural building materials, including straw bale, earthen walls and plasters, natural timber and fibres, and has designed numerous buildings using these materials. He promoted the integration of productive plants and restorative buildings to create permaculture-based designs he calls 'livingscapes'.

He has served as Chair of the Standards New Zealand Technical Committee for Earth Building Standards for the past 25 years and was a founding Trustee of The YIMFY Trust—The Centre for Appropriate Building Technology.

He has presented papers at conferences around the world and gave the keynote speech at the International Conference on Straw Bale and Natural Resources in 2016.

Mr North is a Life Member of EBANZ and a Fellow of the New Zealand Institute of Architects.

# From the back porch...

## *Bushfire victim support*

*With so much overwhelming loss and destruction, it is sometimes difficult to imagine how you can possibly help. With the proliferation of fundraising drives, and the associated dismay that money and supplies often don't make it to the people who need it quickly enough, one way to make a difference is to offer your services. An example of this is Tradies for Fire Affected Communities* **(tradiesforfireaffectedcommunities.com)**, *created as a place for tradies of all disciplines around the country, to put their hand up and donate their time and skills to those affected by these devastating bushfires.*

*In this spirit of offering what you are good at, Peter Lees (former architect) and his wife Irene O'Keefe have been thinking of ways to help people rebuild after losing their homes. Knowing that at least one of Peter's clients has lost everything, he feels he can offer his experience and planning resources to provide a start for a new project.*

Irene says, 'Peter is deregistered now as a practicing architect, but legally his beautifully detailed working drawings are still being purchased and approved ready for council submission, once his plans have passed scrutiny and been signed for, under the umbrella of either a registered architect or draughtsperson. Peter's comprehensive working drawings package is at the very least a great start point, cutting out the full expense of a whole design and drawing service.

'We are more than happy to devote our time freely for bushfire victims, including ongoing free building advice (as we have always offered to anyone, client or not, over many years), but Peter has expressed that there would need to be a cost to cover his large drawing package (three sets of A1 prints, computations, specifications, and sundry data), plus the postage. This is purely to cover the costs of materials and we would hope it not be seen as cynical opportunism.'

Peter takes up the conversation, 'Irene's willingness to help bushfire victims, who have lost everything in the recent fires, sparked the offer of free advice and (should they choose to) the selection of one of my generic house plans (full working drawings), to help them rebuild.

'For genuine bushfire victims, I am offering the plans booklet and generic plans designs at cost only.

'The *Plans Book* would be the start point, to help decide which of my flexible generic house plan designs would be best suited. This will cost $10 (usually $20) including postage.

'A *House Plan Design* consists of three sets of working drawings (up to 10 full size A1 plan sheets), three copies of Specification booklets, three copies of Structural Computation booklets, a 'How to Build' booklet, plus other printed documents to help with the building process. This would be for a cost of $100, which includes postage to an Australian mainland address.

'Should anyone wish to take up our offer, or merely want to further understand what we are offering, I would much prefer they contact us by phone. I have spent my working life offering free advice to people (not just clients), over the phone – it is what I do best, and I can better gauge how to respond to queries in a more personal manner. My offer would be ongoing for some time, because I know a lot of people will need time to recover from the trauma they have just suffered.

'I don't mind saying I feel at a bit of a loss as to what to do, but I hope my many years of experience designing, helping clients and building will be of use.'

***Peter and Irene can be contacted by phone on 03 5258 3839.***

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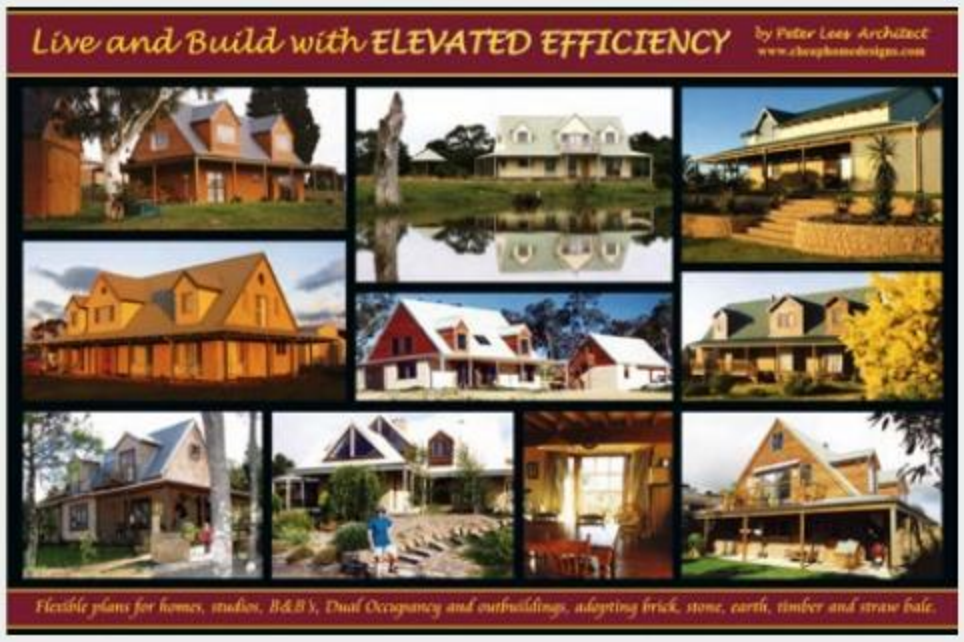


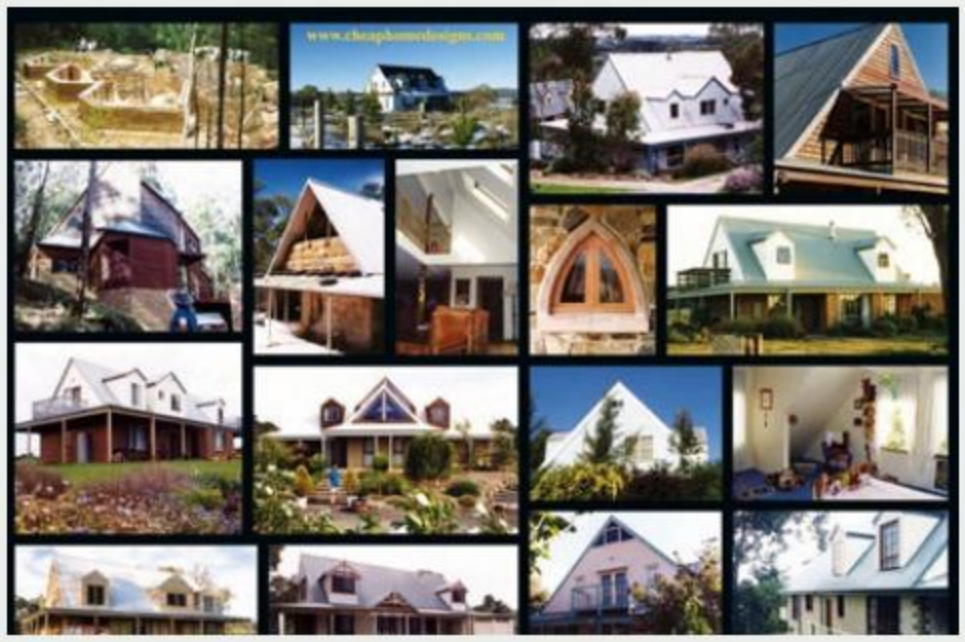

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