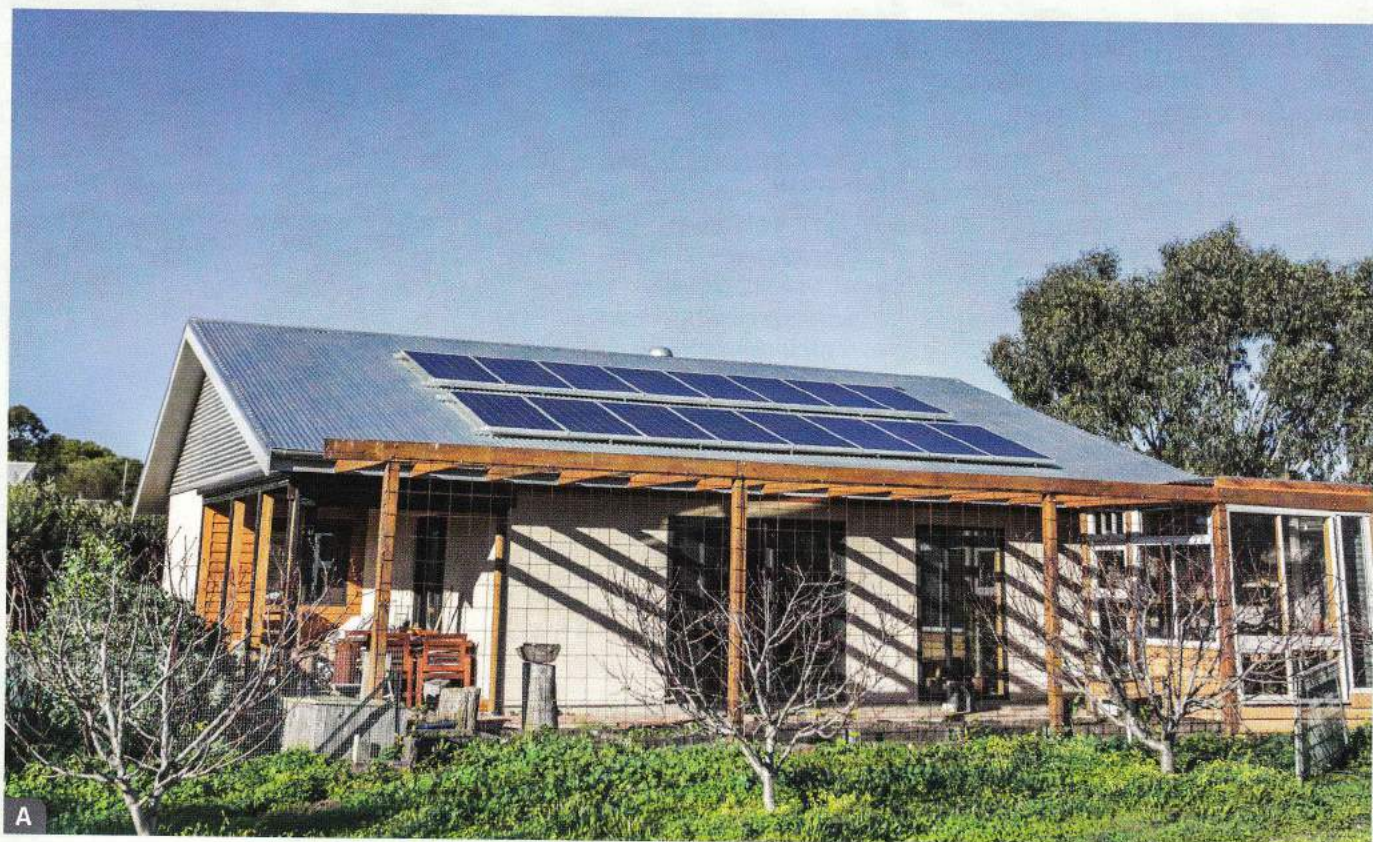


A modest living space

Everything we need – and a whole lot more



Ever since learning about natural building techniques, Dani and I have felt a strong desire to build our own house. It was during time spent living in the UK that we first discovered straw bale building, cob techniques and the importance of passive solar design.

Tiny house experience

After returning to Adelaide, friends told us about a project in the Aldinga Arts EcoVillage, 40km south of the city, where a group of people were planning to build a (very) tiny house – only eight square metres. Almost all the materials were

BY SAM RYAN

sourced for free, including a dilapidated caravan that was demolished to reveal a 5m trailer, and many volunteers came to lend a hand during the 21-day build. I was involved from the early stages, collecting materials and then working on site almost every day. It was a fantastic experience to work on many aspects of construction; framing, insulating, roofing and cladding. An important lesson was also learned for Dani and I – we like

modest living spaces but not tiny ones! Strong friendships were formed with people from the EcoVillage, and the idea of building there was planted and began to grow.

Buying the land

The EcoVillage began in 2002 on a 34 hectare, mostly treeless and degraded horse paddock. It is now the largest in Australia by population, with around 400 residents, and covered in native vegetation, orchards, water retention ponds and community spaces. Only a handful of properties were undeveloped

in 2014, when we looking to purchase, and none were on the market, so we asked around and found the contact details of people who owned empty lots. I cold called several of the block owners, only to find that they were still planning to build or had just gone through a divorce and so were not ready to think about building or selling.

Luckily, the couple that owned our favourite block were on the fence about building, and after some discussion agreed to sell privately; saving both of us a considerable amount in real estate fees. The block is 450m² of private land, with around 500m² of community-owned common land to the west, north and east. All lot-owners in the EcoVillage also jointly own 'the farm', which is around 17 hectares. This area contains significant orchards, a chook paddock, leased market garden, composting area, and wastewater treatment plant that provides recycled water to all community fruit trees.

Designing the dream

Our hearts were set on straw bale from the outset; for its thermal properties, its low environmental impact, and the ability for us to do a significant amount of baling ourselves. Dani attended the 2014 Ausbale Conference, and heard talks by local architect Bohdan Dorniak (Bohdan Dorniak and Associates), builder Lance Kairl (House of Bales), and engineer Gerald Wittman (GW Wittmann and Associates). There was little doubt in our minds that this trio would be our first choice to work with, given their extensive experience in straw bale building. Our brief to architect Bohdan and his associate Andrew was for a one or two bedroom, one bathroom house sited as far west and south as possible on the block, to allow for maximum vegetable production to the north and east. This resulted in a floor plan of 120m²

After speaking with many people who had also built in the Village, we decided not to have any western glazing, to reduce heat gain in summer. Additionally, we decided to arrange our galvanised steel rainwater tanks along the western wall, further shielding the house from howling westerlies and the hot afternoon sun. These tanks total 30,000 litres, which in an average year is the maximum the small roof can catch. There are five tanks

in total, two of which act as a first-flush system without discharging any water; the main outlets are located 500mm off the base, which allows any sediment to settle and is removed periodically when the bottom outlet is used on the garden.

As a fermenting enthusiast, one unusual design requirement was to have a large walk-in-pantry to store preserves, beer and wine. This pantry was sited to the north-west, which in a standard construction house would have been foolish, but we were confident the straw bale walls would provide adequate insulation.

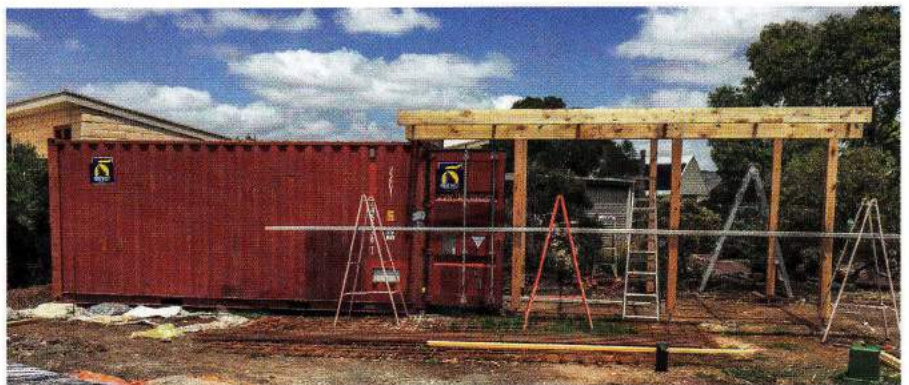
The budget constraint we gave for the project was \$130,000-\$200,000.

Slab pour

In July 2016 building permission from Onkaparinga Council was gained. Council had no issues with the design or construction methods, but suggested that the shipping container shed be clad, which we were keen to do anyway. Unfortunately, the approval coincided

with an unusually wet spring and summer, which was causing havoc in the concreting industry and meant that everyone we spoke with was predicting a January pour at the earliest. This seemed ridiculous, and we pushed for a pre-Christmas pour, but it did not happen.

Thankfully the piers for the shipping container did get poured, and a second-hand Royal Wolf container landed on site in early January. The first project was to build a carport off the container, which gave us a shaded spot to work and rest while on site. The container was also extremely useful in its capacity to store tools and building materials safely and easily. We cut holes in the northern wall for a window and door, and clad the north and eastern faces with scrap timber that we burned with a flame weeder. The idea relates to a Japanese technique called shou sugi ban, which is usually done with cedar, and requires no further treatment to ensure waterproofness and the ability to withstand rot. Given that most of the timber we used was pine, we opted for two coats of decking sealer.





Another design consideration was to have the minimum number of ceiling penetrations for lights and fans, given the potential for heat loss and gain through these holes. The solution was to install collar ties – massive beams that span from the spine wall across to the LVLs. After searching in many salvage yards, we discovered the 1860 Moonta Bay Jetty beams, complete with bitumen staining and salt bleaching. These allowed us to hang fans, attach dimmable LED battens that provide beautiful uplighting, and indulge our love of timber with character.

Baling school

After first-fix carpentry, the time came to call on our friends to help with baling. We ran a two-day 'baling school' workshop with Scott from House of Bales, to prepare the site and learn all the techniques for constructing walls. During the workshop the main bedroom was completed, then it was over to us to complete the rest of the baling during the following Easter weekend. It was perfect weather and a great atmosphere on site. People split into teams; some who knew each other and others who formed friendships during the build. Good music was always playing and we strictly adhered to sumptuous meal breaks – morning tea, lunch, afternoon tea, and



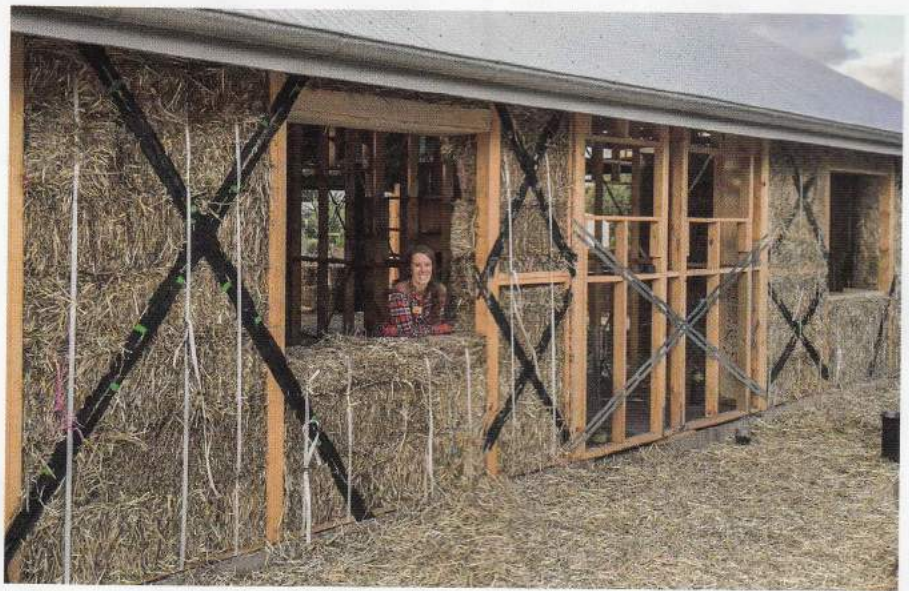
The timber frame structure is post and beam for the external straw bale walls, and standard 90mm stud framing for the internal walls, with the exception of the 120mm spine wall. North of the spine wall there is a raked ceiling, supported by LVLs (laminated veneer lumber), while the south of the house is a truss roof. Carpenter Hugh made several design suggestions, which we were able to incorporate as we went, including a fantastic loft space accessed via an attic ladder in the mud room, which has dramatically increased storage space.

The slab was finally poured in January, and we mixed black oxide into the very top layer of concrete to increase thermal gain. To achieve a more textured look, we also threw browns and red oxide across the slab surface as the concreters did the helicoptering.

Post and beam frame

We are blessed with amazing neighbours. Our southern neighbours are good friends and allowed us to spend many nights during construction with them, and also provided power to the site before electricity was connected. Our western neighbour is legendary carpenter Hugh Griffiths, who was incredibly helpful in recommending trades, where to source materials, and did a fantastic job on first and second fix carpentry with his team. I was also able to labour with the chippies, which helped to reduce costs as we paid an hourly rate for their time.







beer-o'clock at 4pm. The attention to detail and quality was excellent, even as the walls flew up with great speed.

Because we had extra time and people on our hands, we also ran a cob building session. Local clay from a neighbour's excavation, combined with paving sand and a few handfuls of straw made beautiful foot-stomped cob, which we packed into stud walls between the kitchen and pantry, and also between the main room and second bedroom. This was inspired by a workshop given by Martin Freaney of the *Earthship Ironbank*, and gave thermal mass to these internal walls. Given the second bedroom only has one southern external wall, we knew this would make the room cooler in the heat of summer, and could act as a cool refuge in heat waves.

Finishing off

Lance and Scott, who also allowed me to labour with them, did the rendering for us, as previous experience showed we didn't have the skill or the stamina. After the first coat on the outside of the house, the pump feeding Scott's rendering wand died, but the guys didn't skip a beat and switched to hand rendering for the remaining two coats externally, and three coats internally.

For the exterior walls, we used a blend of paving and brickies sand, lime, and a dash of cement (less than 5%) for the exterior walls. This is done partly for strength, but mostly for its hydrophobic (water repelling) properties.



For the interior walls, we used more of the local clay, white potter's clay, and playpit sand. The result is a beautiful light grey that almost looks like suede. No sealants were used internally, which makes the walls somewhat delicate, but also allows for easy repair.

To seal the plasterboard walls we used *Volvox* natural clay paint, which is no-VOC, needed no priming and only required two coats. There were only seven colours to choose from, which was a relief compared with the hundreds on offer in the synthetic paint range. The slab was sealed with *Livos* linseed-based wood oil – once before baling and once more after rendering.

Perfect performance

Since moving in just before Christmas of 2017, we have experienced heat waves and cold snaps, and the house has performed beautifully. Like many passive house owners, we are slightly obsessed with internal and external temperatures. This temperature differential determines whether we open or shut the windows, pull blinds or push the couch back as far as it can go so the sun can hit as much slab as possible.

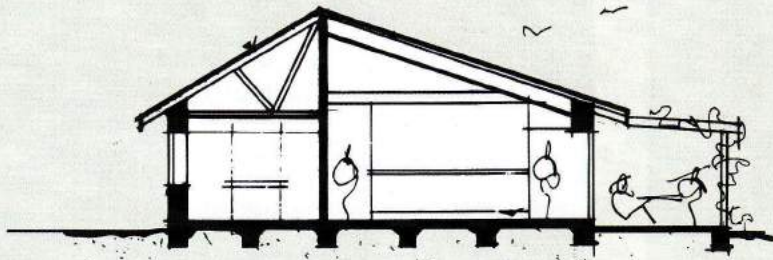
The highest recorded internal temperature thus far was 28 degrees during a series of 40 degree days, and also happened to be when I was boiling 30 litres of wort for homebrew beer. The coldest temperature recorded was just recently in August, when we returned to the house after a few days away and

hadn't been around to close blinds at night; it was 17 degrees.

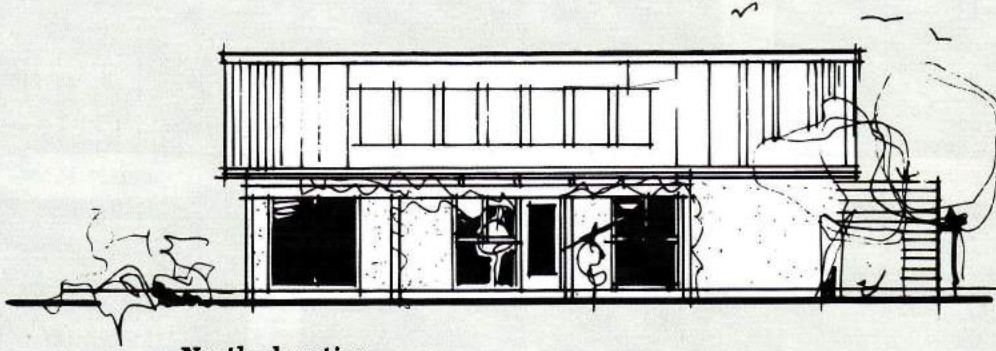
These extremes don't tell the full story though, as comfortable living is a game of averages. Winter temperatures typically fluctuate between 18 in the early morning to 22 in the afternoon, especially when brewing or baking. In summer the temperature typically hovered within a couple degrees of 22.

As the saying goes though, 'a passive house needs active participants'. We have installed thick woollen blankets as curtains to the north and east, while the bedrooms have two blinds, one in front of the other; a retractable blind to block light and then a cellular blind to trap air in its hollow core. These all help with controlling the indoor temperature.

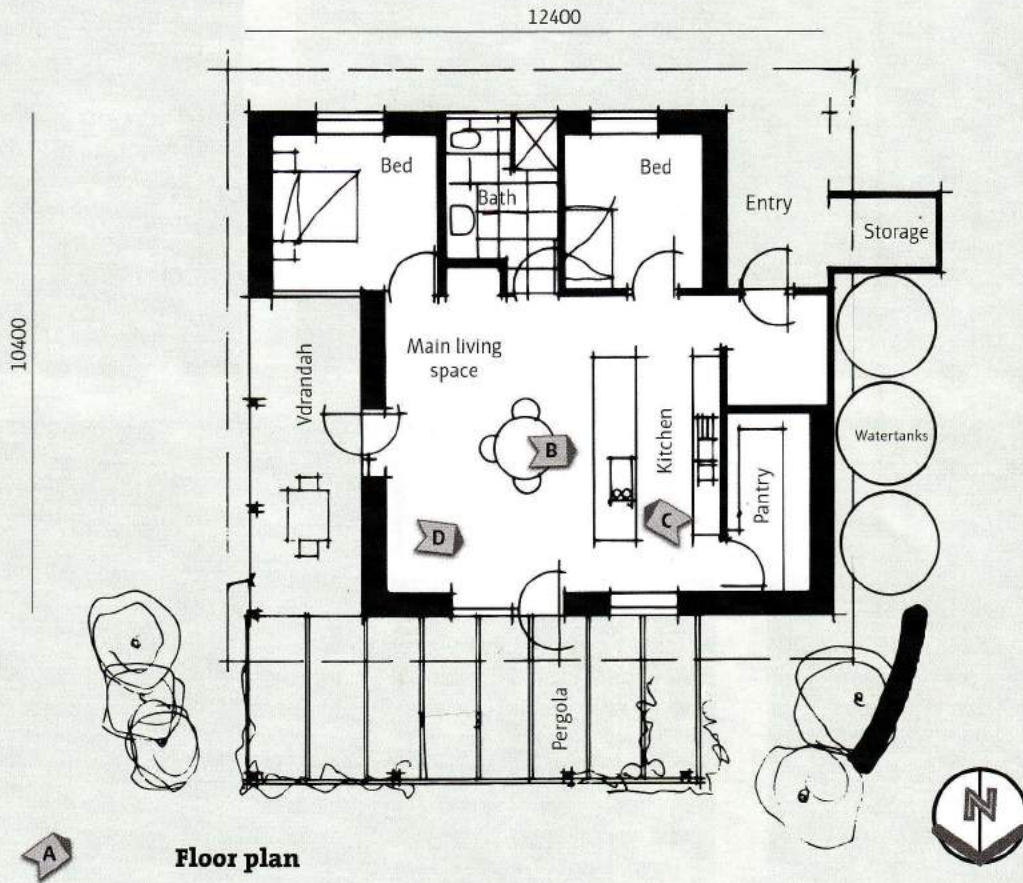




Section



North elevation



Floor plan

Arrow letters refer to photos

Making decisions

When owner building, we've found one of the greatest aspects is being able to design and purchase items exactly as you want them. We had a rule that we would always try to find materials and objects that were either compostable, recyclable, or second-hand.

As a keen cook, I've always wanted as many food stuffs laid out exactly where I can see them, to know what I have and also provide ideas for what to cook. The kitchen shelves are two fine-sawn Tasmanian oak boards, which hold

most of our dry goods. The timber theme continues with an enormous kitchen island, made from two Adelaide Hills grown Himalayan cedar we bought from a local timber miller. It is a colossal 3.3m long and 1350mm wide, with a straight cut edge on the kitchen side, but a wavy natural edge on the opposite. This natural edge timber is echoed by the skirting boards, made from the same timber.

The double-glazed *Rylock* windows are thermally broken aluminium, and aside from the awning style in the bathroom, are all casement. The design allows the window to open either east or west in our

case, though because the glazing extends out from the frame, it creates a gap on the opposite side and can take advantage of cooling breezes from both directions. The aluminium does get hot and cold, which is probably the weakest thermal-design aspect, but we respected the ability of aluminium to be fully recycled at the end of its lifecycle. Around the windows we opted for a slightly unusual shape for straw bale – instead of the usual rounding, they are a sharp 35 degrees, which allows more light penetration and reminds us of the Japanese castle where we first saw the design.





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Services efficiency

The house is all electric, and as such the island contains an extremely efficient *Miele* induction cooktop, basic *Smeg* oven, and side-by-side *Airflo* fridge and freezer. It is a very small fridge by modern standards, but we wanted to only have enough fresh food that we could eat in between weekly market visits, and we also didn't like the idea of a large fridge dominating the aesthetic of the kitchen.

The sink is a custom stainless steel bench and suits the shallow 40cm depth of the *IKEA* cabinetry. We reluctantly bought standard particleboard cabinets and chose solid ash timber fronts. To be fair to *IKEA*, the systems they employ made it very easy to install and customise, and they have performed extremely well so far.

We were lucky enough to find Dave Gillett, a plumber who still prefers to work with copper. Originally, we thought of having exposed piping to avoid introducing water into the straw walls. It turned out that all the plumbing centred around stud walls, but we were already hooked on the idea of creating interesting shapes and being able to identify and fix leaks easily, hopefully not for another 80 years. Using copper in this way allowed us to hang items from the pipework, and because we hate mixer taps with a passion, we indulged our love of gardening by using garden taps and a simple bent piece of copper for the spout.

Ever the ideas man, Dave suggested we use copper to make our towel rails, which worked perfectly and cost a fraction of what a shop-bought version would have.

Settling in

Since building, we have worked hard to get our vegetable garden going by spreading the topsoil saved from the house site, which we mixed with nine tonnes of quality compost. We've adopted a market garden approach of 800mm wide beds running north-south, and dedicated a large patch to growing berries, hops, and subtropical trees like avocado and mango. There is no shortage of stone fruit, apples and pears in the EcoVillage, so we are trying to grow things that aren't as readily available. The most recent project has been to build a greenhouse from recycled glass and metal, which should allow us to propagate large numbers of vegetable seedlings and other plants from cuttings.

Future projects include a green roof for the shipping container, filling common land spaces with native plants to boost biodiversity and reduce pest pressure on the vegetable garden, and create an outdoor woodworking area for the carving of bowls and spoons.

We very much enjoyed our owner building adventure, and would recommend it to anyone who can't find what they are looking for in the existing stock of real estate. ♦



Links & resources

♦ Bohdan Dorniak & Co.

Architectural design, specialising in straw bale and alternative construction.

08 8344 8170,
www.bdcoarchitects.com.au

♦ House of Bales

Straw bale building, consulting and owner builder assistance.

08 8555 4223,
www.houseofbales.com.au

♦ G.W. Wittmann & Assoc.

Consulting structural engineers.

08 8352 7764

♦ Aldinga Arts EcoVillage

Lifestyles for a sustainable future.

www.aldingaartsecovillage.com

♦ AUSBALE

Promoting straw bale building in Australia.

www.ausbale.org

♦ Livos

Natural and safe surface treatments.

03 9762 9181, www.livos.com.au

♦ Volvox

Heavy duty washable wall and ceiling paint.

02 4788 1117, www.volvoaustralia.com

♦ Rylock

Custom windows and glass doors.

08 8413 5500, www.rylock.com

♦ Earthship Ironbank

Open days, workshops, bed & breakfast.

www.earthshipironbank.com.au

♦ Lime & Soda Design

Specialist energy assessing consultancy.

0402 346 942, www.limesoda.com.au

♦ PBS Australia

Building certification, surveying, audits.

08 8374 2211, www.pbsaust.com.au

