

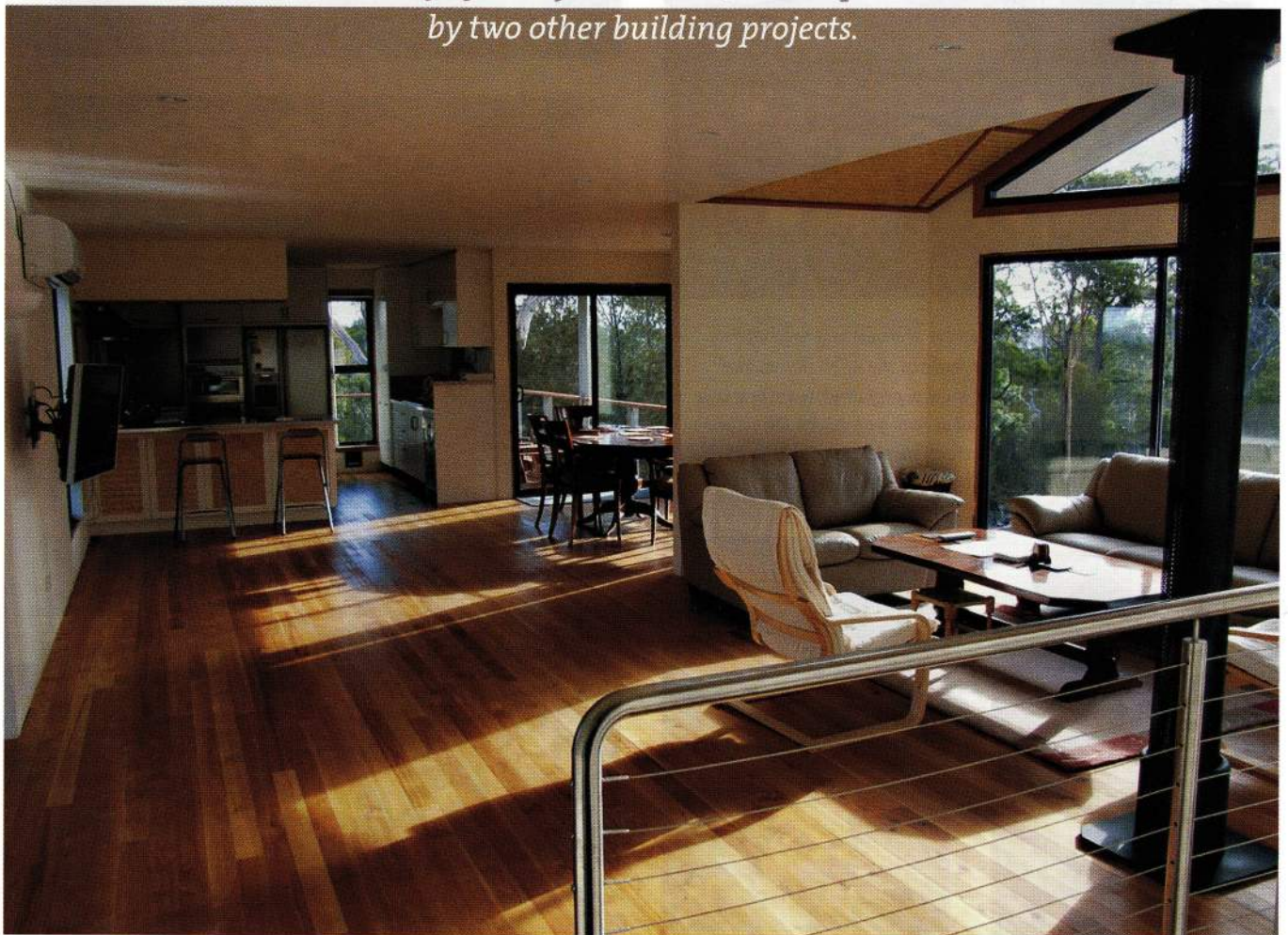


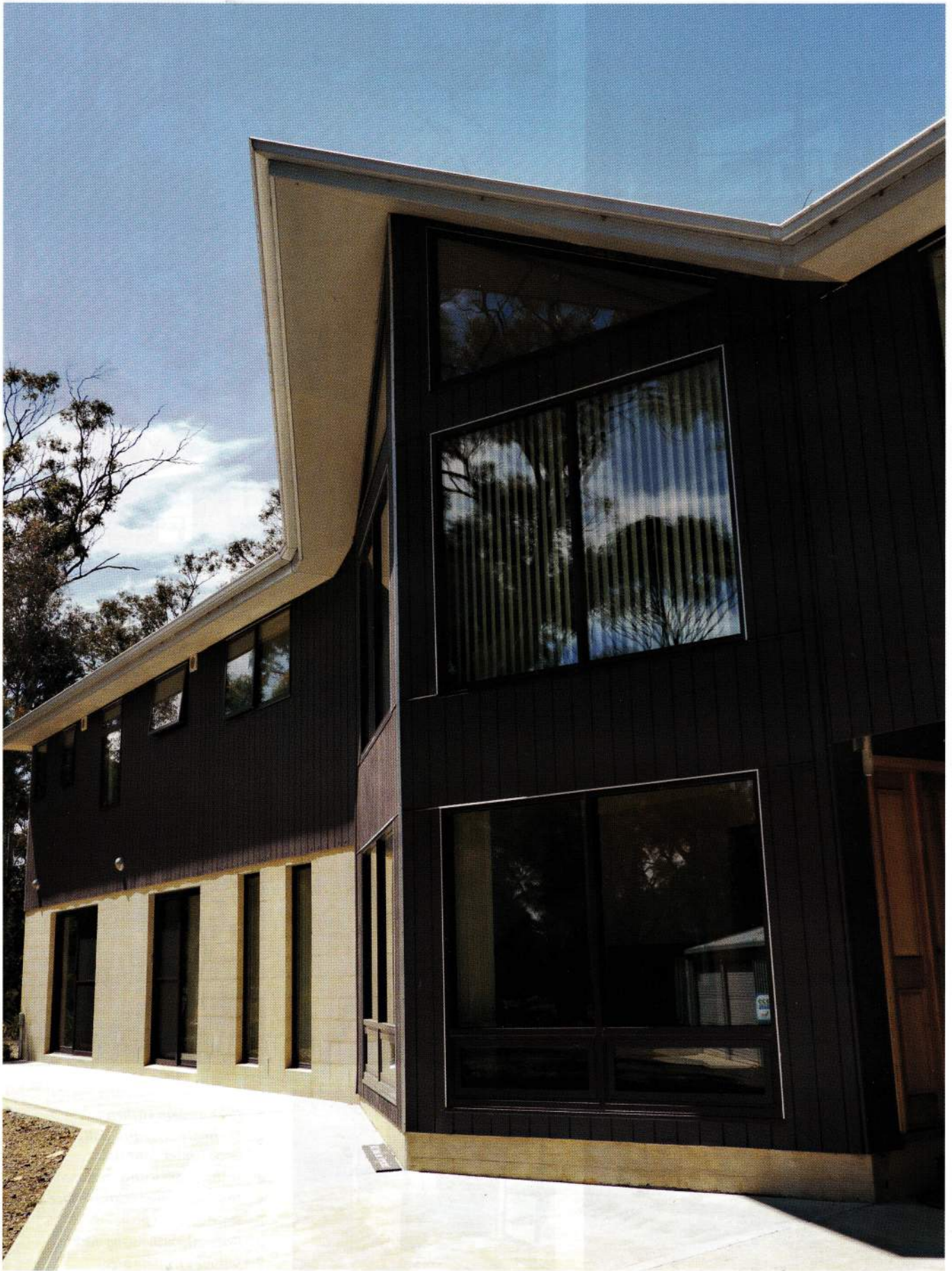
Passively and patiently solar

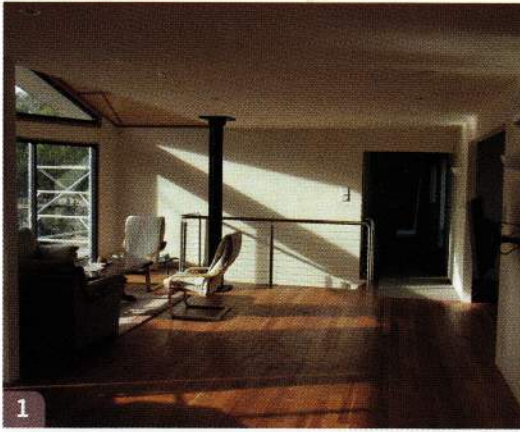
BY VIRGINIA COWIE

PHOTOS BY VIRGINIA COWIE & PHILLIPPA DENNE

This is a story of a very slow build, interrupted as it was by two other building projects.







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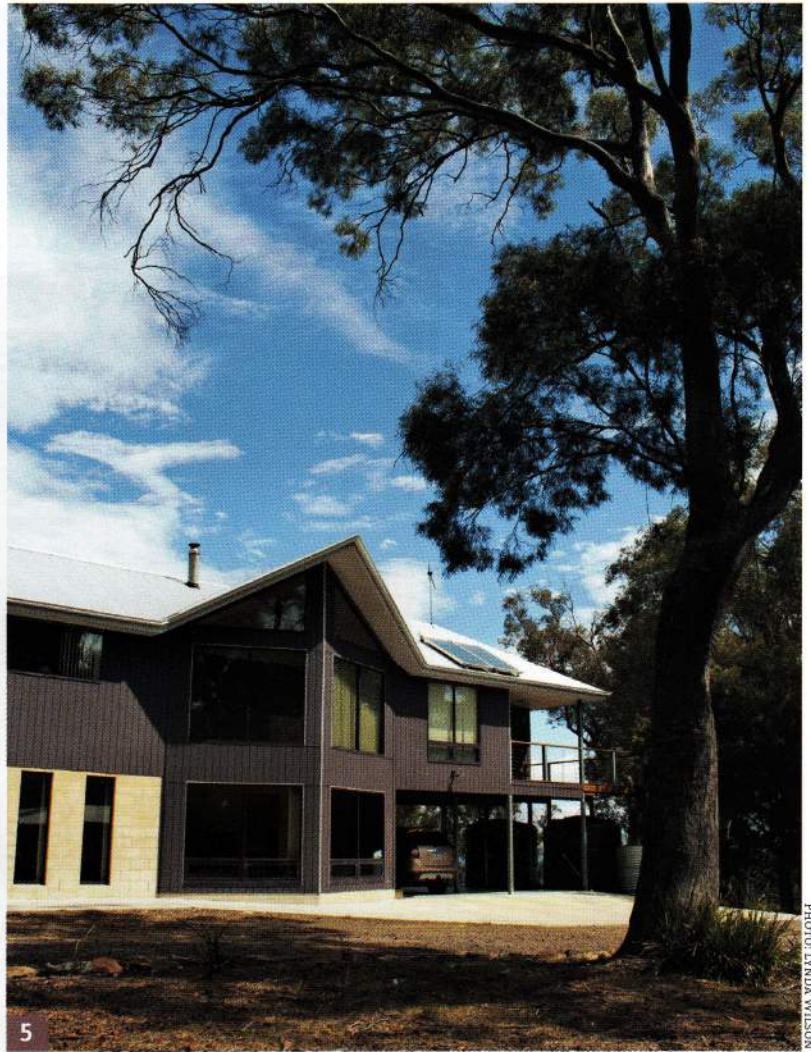
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PHOTO: LINDA WILSON



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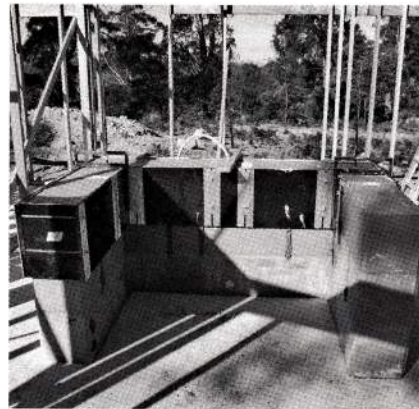


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1. *Passive solar at its best.*
2. *Sleek modern kitchen.*
3. *Thermal mass earth wall around wood heater downstairs.*
4. *Sitting room with a treetop view.*
5. *Large windowed northern face.*
6. *Stairs to lower floor.*
7. *External south facing decks.*
8. *Secluded reading area.*



It all began in 2000 when we decided to emigrate to Tasmania from the UK. We purchased 135 hectares of rural land near Coles Bay in 2001 while on a visit. Following delays getting visas and selling our UK suburban bungalow, we finally arrived in Tasmania in August 2002.

Research

We were keen to build green and we set about getting ideas together for the house design; talked to architects, researched green design and products, sketched up a design, engaged a draftsman and took plans through council. We also spent time on the site, watching how the light interplayed with the large trees and also observing how the site was affected by weather. We made a special effort to witness sunrise and sunset on the winter solstice so as to get the axis of the passive solar house right – it needed to be slightly skewed to the west as we have a mountain to the east which makes our winter sunrise about an hour later than on a clear horizon.

Design – no snakes!

The design was heavily influenced by our early experiences living in rented accommodation in the Tasmanian bush, including running out of tank water all soaped up in the shower, finding scorpions running around in the sitting room (which had come in on the fire wood) and, worst of all, finding our beloved cat dead on the back door step from a snakebite. It was also influenced by having 16 weeks of UK house guests during our first year. We therefore ended up with a design that is essentially upstairs living (no chance of snake access), has plenty of water catchment,

L-R: First floor trusses in place, ready for framing of upper floor; Formblock was used for the internal thermal mass wall; concrete block clad lower walls.

the wood heater is on the ground floor and it includes a self-contained apartment for house guests. It is also a design which incorporates spaces for running our accommodation business including an office, reception and laundry.

Solar passive

Over and above this, it is a passive solar house with a large, big windowed north facing flank, a slab the width of which was designed to allow for maximum solar heat gain during winter and broad eaves to protect the floors from summer sun. There is an element of the survivalist about us too, so the house is designed to run off the grid if this is ever required, including solar/wood heated/electric boosted hot water, a PV system and tank water.

Our first choice was to build with straw bales and although a few houses were being built this way in Tasmania, at the time none of the local players had any experience of it, including the engineer. He was adamant that we should position the house to run with the contour rather than east/west – which happily also looked at the view of the Hazard Mountains and the Swan River Estuary. He also wouldn't countenance anything other than a conventional build. Straying beyond the standard was going to be difficult, so we relented on the build materials but insisted on the passive solar layout.

We had a similar experience trying to obtain an in ground heat source pump

and hydronic heating, the only option at the time being to import a system from Europe or the US, which was cost prohibitive. Our solution was to adapt the local standard by connecting a solar hot water system with a wet back system and maximising the effectiveness of the woodstove by positioning it on the ground floor in the heart of the house and coupling it with heat transfer units. The window company argued hard that we should use low E glass, but the technical specifications suggested that in the Tasmanian temperature zone, double glazing would be a better bang for our buck – we wouldn't compromise on this.

Delays

Red tape, a death in the family and work on establishing our accommodation business all led to delays in turning the first sod, but eventually work got under way in mid 2004. Initial tasks were to build a shed, to trench the phone line from the main road (1.6km) and to extend the nearest power supply by three poles. All three tasks were a baptism by fire, including the trenching contractor getting bogged twice, the power supply company suddenly doubling the width of cleared easement required and the shed kit not fitting the slab we had laid. All were readily overcome, but not without stress.

Slab

Then followed the footings and insulated slab (100mm polystyrene sheets) for the house. With polished concrete in mind we had visited example floors and chosen a pink quartz aggregate, called Stoodley, to replace the blue metal in our 12 cubic metres of concrete. Unfortunately the final concrete

truck brought a surplus, so three tonnes of our aggregate went into the slab for a neighbour's shed rather than into our landscaping supplies!

Limiting waste

After getting the slab down in July and August 2004, from September until the following March 2005 we deflected our attention to the building of our eco lodges, income earning potential being more pressing than comfort. Returning to it in April we had a new builder who had agreed to let us manage procurement. The original builder had a rule of thumb to over-order all materials by 10% to allow for wastage and mistakes. Thus at the end of the eco lodge project we had a range of materials left over – not a problem with another project coming up, but a pattern we didn't wish to repeat. This proved to work better for us as more time spent assessing quantity requirements led to very little wastage.

First floor

While our new builder began framing, we commenced mixing and pouring the blocks in the internal earth wall – an additional thermal mass. We had originally planned to use rammed earth, but an initial quote had suddenly been revised from \$4000 to \$7000, so we turned to *FORMBLOCK* to do it ourselves – a crucial ingredient for which we soon found was the cooking oil used to prime the surfaces of the forms, without which lumps of 'green' wall would pull away with the forms when dismantled.

At this point the daily entries in my building diary give way to all sorts of technical details about bracing rods for the steel, the bracing ply required for several of the walls, insulation quantities, layout and spec for the deck bearers and joists, spec for the bespoke hot water tank (because it required both wet back and solar connections), the window order, lintels, quantities of roofing sheets and sarking, scaffolding hire, decorative ply procurement for lining the cathedral ceiling, architraves, doors and door furniture, flooring, kitchen design, stairs, electrical components, lights, taps, bathroom fittings, water tanks, heat pumps, heaters and heat transfer units, insulation etc. etc.

Second floor

It was a milestone when finally the upper floor particleboard could be laid and trimmed and the second floor framing could begin. An extension had to be added to the eastern end of the building to accommodate a drainage stack – unforeseen by the draftsman, but insisted upon by the plumber because of insufficient fall within the first floor trusses to go the distance to the internal stack.

The final drama at this stage was when the *Aircell* insulation was delivered only to find that the advertised R3.4 was for downward insulation only – upward being R1.3 – so we had to return it to the agent on the north coast of Tasmania.

Inspection

With roof trusses installed and after getting a scaffolding company to set up a peripheral guard and then dismantle it, by early August the roof was on, the double glazed windows had been delivered and were being installed and it was time for the framing inspection. As an owner builder project managing and working on a project with an unqualified builder this was a nerve racking moment. Bated breath gave way to a brief list of shortcomings, mainly concerning additional tie downs.

Several months and another change of builder later, we had the walls clad and the lower floor plasterboard hung, so shortly before Christmas 2005 we were able to move from the little cottage on the property into the lower floor apartment in the house in order that we could let out the cottage over the summer season. By mutual consent with the builder we took time off building between Christmas and the end of January – our peak holiday season when we are busy servicing the cottages.

Fiddly jobs

During 2006 the upper floor plasterboard was hung and stopped up and trades were coming and going to do their final fixes while the builder completed the external decks and stairs and then returned inside to lay the celery-top pine (*Phyllocladus asplenifolius*) floors and give us a lesson in tiling. A very drawn out process ensued with lots of fiddly jobs involving several trades that never seemed to arrive at completion. For

example, coordinating the electrician and the refrigeration expert to fit the heat pumps, the plumber and the builder to fit the shower base and bath and the glazier and the builder to fit the shower screen.

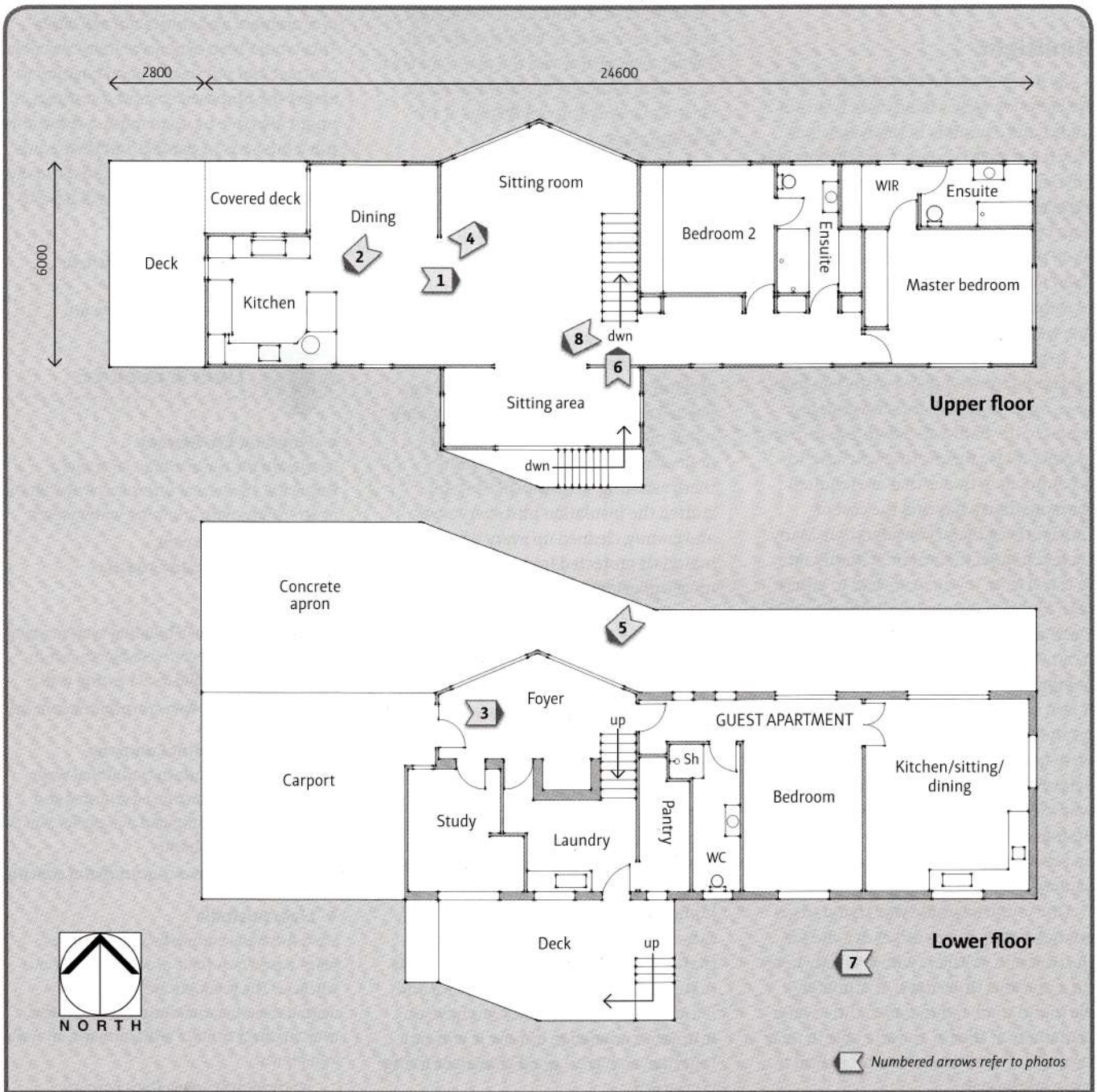
We were keen to get everyone off site so that we could oil the wooden floors before a trip away in early November during which they would have a chance to cure without two and four-legged traffic. By Christmas 2006 we finally got the upper floor plumbing and electrics turned on so we were able to move out of the apartment and into the main part of the house.

Early in 2007 we decided to apply for a Tasmanian Tourism grant to build two venues. This was a unique opportunity, so while it wasn't ideal timing for us, it was not to be missed. In March we heard that we had been successful, so the emphasis suddenly switched away from finishing the house. Some jobs that were left to us – like the architraves, ducting for heat transfer units and bagging the lower floor walls – and others which awaited tradesmen – like installing a booster pump on the hot water supply to improve the delivery temperature to the far reaches of the upper floor and connecting up some of the more sophisticated elements of the TV, Ethernet, phone and infrared controlled home networking system – rumbled on through the year, so it was not until late 2007 that we were ready to receive final sign off from council.

Finished

Give or take a few jobs this house was essentially two years in the building. This is itself something of a marathon, but added to this, six months before and 18 months after the main house build, we were solidly involved in other building projects, so at the end of the entire process we were well and truly burned out. However we do have a very liveable warm house that is inexpensive to run. The passive solar heating is our main source of heat through the spring and autumn, cross ventilation successfully cools the house in summer and the wood heater is very effective at warming the house in winter.

Our water storage tanks with a combined capacity of 90,000 litres are generally full and provide more than ample supply for the house, the business laundry and the vegetable garden.



Natural Paints and *Livos* oil finishes to the timber work were pleasant to work with and certainly have created a clean and odour free environment. While the paints have a slightly rustic finish to them, characteristic of a Tuscan villa, by sanding them we have brought it back to a more modern appearance, which is in sympathy with the clean lines of our square set design. The home networking has also enhanced this simple look as the audio visual appliances are tucked away in a cupboard where the network is terminated and we can control them from any room using an infrared remote.

Hindsight

By deviating from the standard build we knew we were asking more from our trades, and a number of them were not only reluctant to wander from the familiar, but one got the sense that failure was expected! (Being two women probably didn't help either). Of course this made us all the more determined. After all, we hadn't moved half way around the world to recreate another average home like the one we had just left behind in the UK.

To manage a build like this, some two hours from a major centre, you have to be organised as there is no popping round to the hardware when you run out of nails. It also means that you have to accommodate trades that are required for more than a day and the cost of transport is a major consideration. Many trades charged their normal hourly rate to travel from town, so we had to either plan for blocks of work with the plumber, electrician and concrete polisher etc., or, if our work was for less than a day, look to piggy back our work onto another job. It also meant that all materials had to be on site ready for them. The trades that were used to this were able to give me lists of their requirements, but for some it was a learning curve, and not without its dramas as we found ourselves dispatched on several occasions to meet buses or couriers bringing missing components.

One tough example was trying to get enough water on our as yet dry site for the concrete polisher (who was only here for a precious three days). Fortunately we found some redundant 20 litre water containers at the tip, so were able to relay several hundred litres of water to him to rinse off the slab.

Overall we had to coordinate nearly 60 different players, from designers and approvers through trades and deliveries to finishers and fitters and it always amazed us how many of them ignored directions and ended up in the neighbour's driveway!

With the benefit of hindsight we should have been bolder about hiring and firing, without feeling beholden to any particular tradesman. Using three different builders had its advantages as each brought a different skill set and emphasis with their input and we now believe that the building world is divided into framers and finishers, it being rare to find one who does both equally well. Taking a long time over the plans enabled us to source and get on site most of the electrical and bathroom fittings at the framing stage.

The extended build time allowed us to make a few changes along the way which have resulted in a better floor plan, better use of space, a better deck plan and a better window arrangement – with fly screens that don't block the views. It also meant we were involved as much as we were physically and technically able, weaving it in between running the accommodation business. When things needed oiling or painting we had it done, when plasterboard needed hanging or flooring needed laying, we were there assisting. We filled all the gaps, stuffed the insulation into every nook and cranny, cleaned up every day, kept materials protected from the rain and, most importantly, kept an ever-watchful eye on quality.

A project like this takes you through a roller coaster of emotions, from the naive commencement highs to the lows of problems with poor workmanship, unreliability, delays, materials wastage and pure and simple misogyny. The sense of achievement is unparalleled, but so too is the capacity to be exhausted – physically, emotionally and financially. It can leave you feeling somewhat ambivalent about your new home – at least for a while, but at the same time you have full confidence that it was properly built, using durable materials like the hardwood frame and if anything malfunctions, you have an intimate knowledge of how it was put together, so have a good chance of fixing it yourself.

Next time?

So what would we do differently another time? Well, if there is a next time, the project will be pre-specified down to the smallest detail and managed like an architect with inspections and payments at certain pre-agreed stages. This wouldn't have been possible the first time, as not only would it have been unaffordable, but we wouldn't have had the knowledge and experience to do it this way. Now that we have seven buildings under our belt, on the next project our time will be spent on the front end with research, specification, procurement and contractor selection. This would keep expensive items out of a contract and put us in a good position to assess the proposed costs of a contract. It might also free us up to more comfortably run a business in parallel, but if we could possibly avoid this we would; so it's really looking like the next project will have to wait until retirement! ♦

Virginia and Phillipa's eco retreat is for sale. For details, visit www.ecopropertyforsale.com.au.



Links & resources

♦ Freycinet Eco Retreat

Located in the centre of the Freycinet Peninsula, the retreat offers accommodation in eco-cabins with stunning water views.

www.freycinet.com,
03 6257 0300, 0408 504 414

♦ Formblock

FORMBLOCK is a wall building system using stabilised earth, or concrete blocks cast in situ to produce a solid load bearing wall.

0418 404 200, www.formblock.com.au

♦ The Natural Paint Company

Natural Paint is made in traditional ways from naturally occurring substances and colours in nature, supplied in bags for you to mix with water at home.

02 6584 5699, www.naturalpaint.com.au

♦ Livos Australia

Livos Australia supplies a large range of plant based non-toxic products for various surfaces. The products are biologically degradable, sustainable and are harmless, even in direct contact with humans, animals and plants.

03 9726 9181, www.livos.com.au