


Inspired by nature



This WA family set out to build the most sustainable, natural and comfortable home they could afford, and they left no stone unturned to achieve a comfortable 9.4 Star house.

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GERALDTON LOCALS AND LONG-TIME *Sanctuary* readers Wade and April Kalajzich wanted to create a joyful family home that responded well to their particular climate. The port city endures long, hot, dry summers, has low rainfall that occurs mainly in winter, and is subject to strong winds all year round.

In 2013, the couple had their initial house plans Design Workshopped by Sven Maxa of Maxa Design (see *Sanctuary* 16). After that review, when it became apparent that the build cost would exceed their

budget, Wade and April asked Sven to help them formulate another scheme for a new site.

“The main difference between the old and new blocks was the size,” Wade Kalajzich says. “I had tried to buy this block at auction about 10 years ago and missed out, so when quotes to build our original brief came in above our budget, and this block became available again, buying this one allowed us to go back to a single-storey plan, which equates to a fairly significant cost saving in Geraldton.”

Using a combination of site dimensions, local maps, online ratings tools, aerial imagery and video of the surroundings provided by Wade, Sven created a multi-sensory representation of the site and its conditions. He used this overview to design a house that dealt with the main climatic challenges – temperatures peaking in the 40s during summer moderated by southerly sea breezes in the afternoon – while making the most of the outlook.

“Thermal modelling software like FirstRate5 is a great tool for climate

response for designers,” Sven says. “And Wade and April were very well informed clients: they had done great research. All of the interior finishes were selected by them.”

Located one street back from the beach, the new site is adjacent to a public reserve that provides views along the curve of Sunset Beach. “I think this is the best view in Geraldton,” Wade says. “Everyone thinks western outlooks offer the only views, but this house frames the view very well.”

“This block was better from a passive solar design point of view, because it had a longer north facing boundary which allowed for the home to be stretched towards the sun, and there are no buildings on the northern side,” Sven says. “We didn’t have to stress about the location of the dwelling on this site – this block offered great flexibility – so we sited it towards

the southern part, which meant there was plenty of room for an orchard, a garage, and good north-facing outdoor areas.”

Having arrived at a design solution, the hard work began in earnest with the build. Wade and April oversaw the job as owner-builders: April managed procurement and negotiated prices, and bought all of the furniture second-hand, while Wade carried out much of the labour.

“I basically ended up building the house myself,” he laughs. “I had studied engineering and commerce and I like making things. I certainly took on more work than I had planned.”

He started by compacting and laying out the site, before a local contractor laid the concrete slab, Wade then worked as the stonemason’s general hand for 12 weeks, erecting the cavity limestone walls.

Limestone blocks were chosen for their low embodied energy (they are sourced from a quarry near Perth) and their ability to maintain stable indoor temperatures when combined with insulation.

Carpenters installed the prefabricated timber trusses for the roof, and roof contractors laid the corrugated steel cladding. “Steel roofs have lower thermal mass, and they transfer the heat more easily, allowing the ceiling spaces to adjust to outdoor temperatures faster,” Sven says. “They also seal tighter from an air-tight perspective, and are better for rainwater collection, which is a big issue in the West where rainwater is such a precious resource.”

Inside, Wade assembled the kitchen cabinets after the zero-VOC plywood was delivered to site in a six-tonne package



Three-metre-high ceilings were adopted throughout, with internal operable partitions still to be installed between the living and guest/play room. The majority of the furniture was purchased second-hand; the fixed pre-fab furniture was installed by the owner: “It was like a giant Lego set without an instruction book, only harder!”



Wade and April had their home ‘design workshopped’ in Sanctuary 16, an experience that underpinned the design of this owner-built 9.4 Star family home.



④ All habitable rooms (and the hallway) have north-facing windows, with smaller openings on the southern elevation strategically located to allow for cross ventilation. The concrete slab is earth-coupled (not insulated) as the priority was to keep the home cooler.

without an installation guide: the supplier had gone broke. "It was like a giant Lego set without an instruction book, only harder," he recalls. "When it arrived, I thought: 'Where do I start?' The kitchen took me another 10 weeks to put together."

The striking black kitchen island and benchtops are Paperock, a sustainably produced composite material that combines recycled paper with resin. All of the timberwork throughout the house – the rock maple zero-VOC plywood cabinetry and joinery walls, and jarrah and FSC certified meranti window frames – is finished with Livos Ardvos Oil, a product derived from plants that is applied by hand using steel wool. Wade treated all of the timber himself, and made 36 security screens out of jarrah and stainless steel mesh as well.

"I worked seven days a week, for 12

hours a day," Wade says. "I wasn't at home enough to drive April mad, but I wouldn't have been the best of company during that time. Looking back, I did too much: I shouldn't have done as much as I did."

"We were very focussed on the budget; the timeline wasn't such an issue to us," he says. "I thought it would take about 12 months to complete, but it ended up being about 18 months: we couldn't get the trades we needed at the right time. In hindsight, it would have been a smart move to have had a couple of general hands onsite for the build."

Now complete, the house that takes its design cues from the natural world – the form was inspired by a limestone reef with waves crashing over it – provides a supremely comfortable environment for the family, Wade says.

"Even though we had the cabling

installed in case we decide to install air conditioning in future, I don't think we'll need it," he asserts. "Last summer was surprisingly good. Night-time temperatures in the house didn't exceed about 26 degrees Celsius, so we all slept comfortably and didn't wake once due to the warmth of rooms."

"During the day, compared to the outside temperature, the house was absolutely beautiful," Wade continues. "It felt like it was air-conditioned throughout. We have the fans going all the time, and the house breathes a lot. I hadn't thought about the doors, which we've had to clamp open: early on there were a lot of doors slamming shut in the breeze."

In winter, the house is cosy and warm thanks to its passive solar orientation and significant thermal mass. "Sven originally suggested the limestone blocks, and I was



worried they wouldn't perform as well as reverse brick veneer, but they do," Wade says. "We've never needed to put a jumper on at night, it's like there's a heater in the house, so it is performing very well in both seasons."

So did the couple's diligent research, meticulous planning and hard physical work pay off? "It was definitely all worth it," Wade says. "You can save time and money by managing the procurement and the contracts, although I have no desire to go anywhere near a building site again!"

"We wanted to use no VOCs and to build a low-impact house, so we are pretty happy with the result we've achieved." ⑤

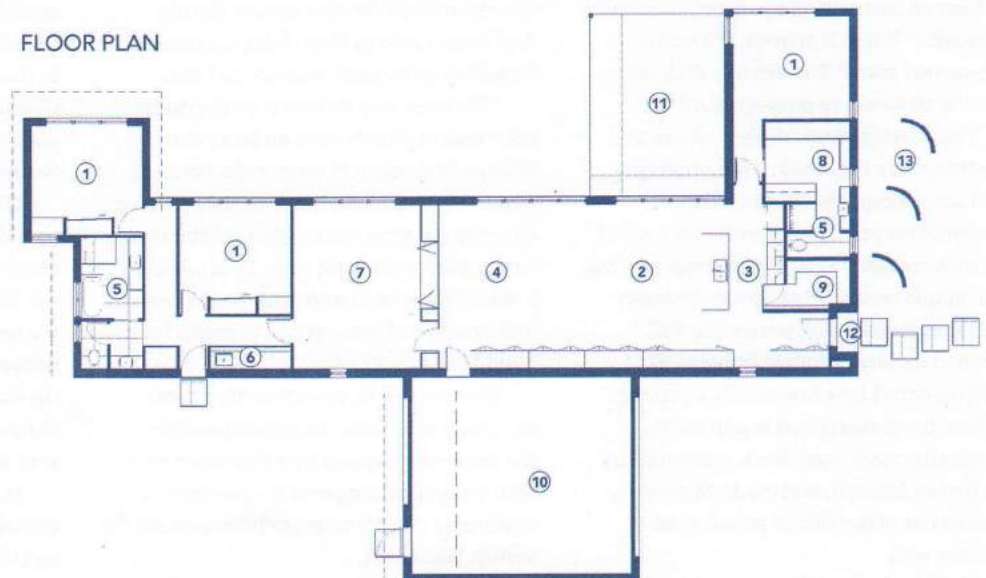
④ A northern outdoor dining area with a solid roof was required to block the northerly sun from the internal dining room to improve the overall building performance – this approach would not be appropriate in cooler climates.



LEGEND

- ① Bedroom
- ② Dining
- ③ Kitchen
- ④ Living
- ⑤ Bathroom
- ⑥ Laundry
- ⑦ Guest/play
- ⑧ Robe
- ⑨ Pantry
- ⑩ Garage
- ⑪ Outdoor dining
- ⑫ Entry
- ⑬ Wind scoops (proposed)

FLOOR PLAN



Reef house

—Specifications

Credits

DESIGNER

Maxa Design

BUILDER

Owner-builder

PROJECT TYPE

New build

PROJECT LOCATION

Bluff Point, Geraldton, WA

COST

\$450,000

SIZE

House 197 sqm;

Garage 54 sqm;

Land 899 sqm

BUILDING STAR RATING

9.4 Stars

Sustainable Features

HOT WATER

- Solahart thermosiphon electric boost hot water system.

RENEWABLE ENERGY

- 3kW grid-connected solar PV system, to make the home energy neutral.

WATER SAVING

- 42,000L Colorbond water tank, collecting water from 90 per cent of the roof area. Tank water is plumbed to the dishwasher, all toilets, drinking taps and is pumped with a CNP water pump with five litre pressure tank
- 2 x Gator Pro grey water systems installed (one at each end of the house)
- Water is dispersed to trees, grapevines and orchard
- Water efficient appliances used throughout.

PASSIVE DESIGN / HEATING & COOLING

- All habitable rooms (and the hallway) have north-facing windows, with smaller openings on the southern elevation strategically located to allow for cross ventilation
- The concrete on-ground slab is earth coupled (not insulated); eave projections calculated to keep sun off the walls all summer, as the priority was to keep the home cooler
- 3m ceilings were adopted throughout.

ACTIVE HEATING & COOLING

- Heavy linen triple weave insulated curtains
- Given the high thermal performance, only 6 x 1.5m

diameter Haiku Big Ass ceiling fans have been installed to the bedrooms and living areas.

BUILDING MATERIALS

- Natural quarry cut WA limestone internal and external skins adopted for its very low embodied energy
- Polished concrete slab on ground with local white sand – Husqvarna HIPERFLOOR finish to reduce the requirement for any sealants
- All external cavity walls are insulated with Kingspan Kooltherm R1.9
- Internal dividing walls adopt the use of the same quarry cut natural limestone; wet areas used utility block walls to allow for tiling
- Colorbond corrugated iron roofing and quarter round gutters
- R1.3 foil-backed insulation blanket directly under the roof sheeting and Knauff earthwool R3.0 ceiling insulation laid directly on the ceiling
- Paperock benchtops in kitchen and pantry
- All other cabinetry is rock maple zero-VOC plywood.

WINDOWS & GLAZING

- Custom-made timber window frames utilising FSC jarrah sills and heads and dark red FSC meranti frames – supplied by Cockburn joinery and all hand-finished with four coats Livos oils to inside and outside surfaces
- Viridian ComfortPlus single-glazed low-e coated glass locally supplied and installed by James Bruce glazing.

LIGHTING

- Brightgreen D900 downlights throughout with insulation protection hoods in the ceiling
- All light fittings within pendants are LED
- CBUS electrical management system for all lighting has been installed to allow for future adoption of remote energy management systems.

PAINTS, FINISHES & FLOOR COVERINGS

- Paints, finishes and floor coverings have been limited through the adoption of natural wall materials that require no painting
- External limestone has been sealed with Bauwerk Savon Noir made from a natural olive oil extract, Livos grava oil was applied to the internal limestone surface
- All cabinets and internal walls have been finished in Livos Ardvos oils.

OTHER ESD FEATURES

- All furniture is recycled and when required has been restored either by local trades or the home owners
- Custom-made dining tables were remanufactured from existing furniture of the owners
- The owners deliberately chose against having a gas connection to achieve a more sustainable outcome
- All appliances are high-efficiency electric including: VZUG Comhair 60cm underbench oven; VZUG Combi-Steam 45cm steam oven; VZUG induction facet 90cm hot plate.