MODERN GREEN HOMES

Sanctuary

ISSUE 52 | SUSTAINABLE HOUSE DAY SPECIAL

High-performing volume builds; garden design for mental health; responsible timber

BUILDING A 'NEW NORMAL'

A SUSTAINABLE WAY FORWARD

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Deepti and Christian's two-and-a-half-storey strawbale home in the Perth suburb of Doubleview is designed for flexibility of use as their family's needs change. The red tower houses the wet areas and is clad in offcuts of aluminium panels salvaged from the architect couple's commercial projects.

A house made for life

LOCATION Doubleview, WA • **WORDS** Rachael Bernstone • **PHOTOGRAPHY** Marcos Silverio

At a glance

- Urban strawbale house
- Two units for flexibility of use, community living and financial sustainability
- Super-efficient building envelope
- Net positive for energy
- Salvaged materials

Opening for Sustainable House Day 2020 on Sunday, 20 September.

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The first strawbale house in its urban area, this flexibly designed and highly efficient Perth family home is adapting well as the needs of its occupants change.

This eye-catching house on a rise in the Perth suburb of Doubleview is unusual for several reasons, including the fact that it was the first strawbale house built in the Perth inner metropolitan area when it was completed eight years ago.

Owners Deepti and Christian Wetjen were looking for a small site close to public transport and local amenities when they spotted their oddly-shaped block in 2008. Despite its constrained building footprint, difficult access via a narrow laneway and location overlooking a busy road, the site presented opportunities to Deepti and Christian. A reserve to the north-east guaranteed access to northern sun, and being located at one of the highest points in the suburb, there were views to both the city and the Indian Ocean. Too difficult for many buyers, the block was also within their price range.

The couple, both architects, had mapped out some key objectives for their project: they wanted to build a compact house with a small footprint, to limit both their initial construction costs and loan interest payments over time. They also wanted a super-efficient building envelope so they could live without heating or cooling all year round, and they were keen to reduce their consumption of water and energy.

Because the site was larger than they'd initially sought and they regularly have their parents visit from India and Germany, the couple decided to create a two-storey home consisting of two self-contained units. They live upstairs with their kids, and the ground floor unit provides accommodation for visitors or for rental income. "Over the years it's offered the possibility of increased community living, as well as financial sustainability," says Deepti. "We have consistently sublet the downstairs unit, for a long time even renting it to friends with a young child, which was lovely. Sharing our house has forged many close friendships, and the income meant we could choose to work less while our own kids were small."
The design also offers flexibility as their children grow older and their needs

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The careful design of the house and garden on the small, constrained block allows two families to share the outdoors spaces and still have some privacy. There are balconies and terraces, a lawn area with kids' play facilities, a shed and boat storage, vegetable beds and fruit trees.

change.

With identical floor plans for ease of construction, the units each contain two bedrooms, a bathroom, an open-plan living area and dedicated outdoor spaces. The upper level also features a loft-like multipurpose space in the roof, currently used as a sewing room, lounge, work and play space.

The wet areas are located in a square 'tower' built with aerated concrete blocks and clad in red metal offcuts, and the rest of the house is a laminated timber structure with steel bracing and rendered strawbale infill walls. Even though it was largely untested for urban housing in Perth at the time, Deepti and Christian were led to explore strawbale as it allowed them to build the house themselves as owner-builders – which they did, mainly on weekends and with the help of Christian's cousin who was on site for several months. They were also drawn to the material's very high insulative properties and the fact that it's readily renewable, natural and an agricultural by-product.

A clever design inclusion is the moveable 'wall' comprising custom wardrobes that separates the two bedrooms in each unit. The backs of the wardrobes are fitted with acoustic insulation and wall panels, and because they are not fixed to the floor, walls or ceiling, they can be easily moved to change the size of the rooms. "When the kids were babies we had one in with us, so the other bedroom was smaller," Deepti says. "But now they are sharing a room and sleeping in bunks, we've made their room bigger. At some point one of them will move out of that shared room and go upstairs, or downstairs, and we can just take the space back. It makes the plan very flexible as our needs change."

The surrounding garden is equally well planned and flexible, with zones for various entertaining and practical functions that enable two families to share the outdoor spaces and still have some privacy. These include balconies and terraces, a lawn with swing and sandpit, a cubby house, garden shed, boat storage, fruit trees and edible gardens along the verge.

Below the driveway, tanks collect and store rainwater which is plumbed for use in the toilets. Another 3000-litre tank near the garden shed stores rainwater for irrigation and drinking. Greywater is treated onsite and used to water the garden, thereby reducing the volume of water flowing to the sewer. The two

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Christian and Deepti live in the upstairs unit with their two children. The strawbale infill walls are finished with lime and sand render and provide excellent thermal and acoustic insulation, important as the house is situated right on a busy road.

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In both units, ingenious movable dividing walls containing storage allow the bedroom sizes to be altered according to need.

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The downstairs unit has the same floorplan as upstairs for ease of construction.

units share one laundry which is located downstairs: it's accessible both from inside the lower unit and via an external door, so that Christian and Deepti can enter from the driveway when tenants or visitors are in residence.

A 2.3-kilowatt solar PV system generates more electricity than the two-family home uses over the course of a year, because there is no need for energy-intensive heating or cooling – just ceiling fans and the occasional use of a column heater on winter mornings. The rendered strawbale walls, insulated concrete slab and sandwich panel roof work together to maintain a comfortable, stable temperature all year round, and they also provide excellent acoustic insulation. Double-glazed tilt-and-turn windows sourced from Germany further reduce traffic noise from the adjacent busy road, and include integrated insect screens outside and blockout blinds inside.

Deepti sings the benefits of building with strawbale. "Perth sunshine in winter can be deceiving when we go outside and realise just how cold it is," she says (and she's wearing short sleeves on the June day when we meet). "There is something very cosy about living in a strawbale house. Yes, there is the thermal comfort and the stillness, but more than that, it's the feeling of being in a sunlit cocoon."

Even though they completed this project before their two children were born, Deepti and Christian set out to build themselves a house that would serve them for all the stages of their lives.

"It had to work for young kids, and then at some point when they leave it's going to be just us. So we wanted a house that would be flexible enough to adapt to all these stages," Deepti says. "We knew that we were going to be here for years, and we didn't see the value in building a house purely as an investment. We just wanted a house that we would really love living in. And we do." S

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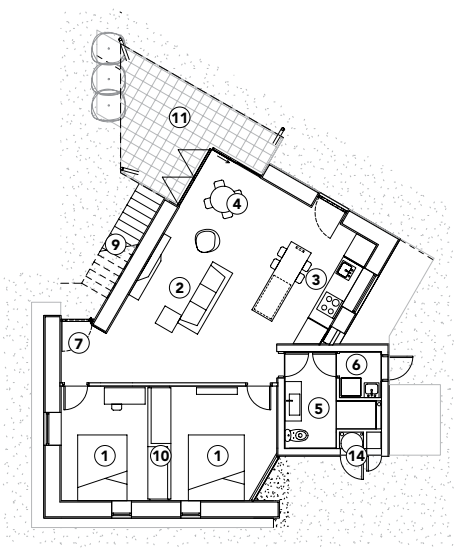
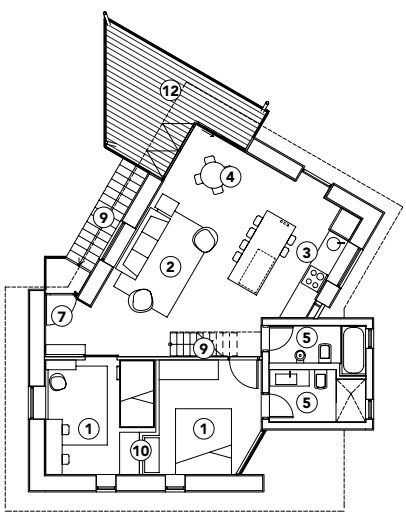
The loft level is currently used as a study and sewing room, but could become an extra bedroom when Christian and Deepti's kids become teenagers.

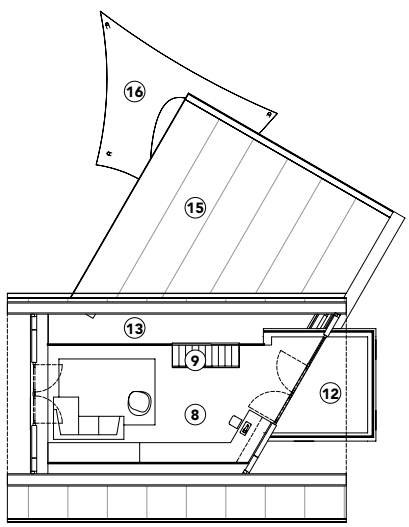
LOWER UNIT FLOOR PLAN



UPPER UNIT FLOOR PLAN



MEZZANINE FLOOR PLAN



LEGEND

① Bedroom
② Living
③ Kitchen
④ Dining
⑤ Bathroom
⑥ Shared laundry
⑦ Entry
⑧ Lounge/study
⑨ Stairs
⑩ Moveable walls with storage
⑪ Patio
⑫ Deck
⑬ Void
⑭ Hot water tank
⑮ Roof below
⑯ Shade sail below

HOUSE SPECIFICATIONS

HOT WATER
- Apricus 315L evacuated tube solar hot water system with electric boost; timer and mobile app-controlled electric booster minimises boosting and allows flexibility

RENEWABLE ENERGY
- 2.3kW solar PV system generates more energy than is consumed

WATER SAVING
- 4,000L in-ground moulded poly septic tank, modified as rainwater tank for toilet flushing
- 3,000L ThinTank poly rainwater tank for garden irrigation and potable water
- AWWS Universal GreyFlow GF01 greywater irrigation system diverts greywater to garden

PASSIVE DESIGN, HEATING & COOLING
- Compact building design minimises external wall and roof area for internal volume
- Highly insulated strawbale walls, insulated slab and sandwich panel roof for thermal performance
- Unobstructed north-facing windows with removable shade sails to maximise winter heat gain and summer shading
- Tilt-and-turn windows maximise cross ventilation without compromising security
- Plentiful natural light reduces the need for artificial lighting

ACTIVE HEATING & COOLING
- Removable wall-mounted fans
- Column heater with timer used sparingly on some winter mornings

BUILDING MATERIALS
- Laminated timber beam and column structure with steel bracing
- Strawbale infill walls: excellent thermal (around R8) and acoustic insulation; readily renewable; reuse of a farming waste product
- 50mm lime and sand internal render; 50-75mm external render with clay and sand sublayer and lime and sand finishing coats
- Highly weather-exposed west walls protected by Colorbond cladding over lime render
- Charcoal-coloured concrete slab floor for thermal mass, with rigid insulation under slab and around perimeter footings
- Bondor Equideck insulated sandwich panel roof (R6.3)
- Wet area tower constructed with Hebel aerated lightweight concrete blocks and prefabricated Hebel slabs, clad with aluminium panel offcuts reclaimed from commercial projects
- Bamboo prefinished floorboards on acoustic underlay to upper level and mezzanine
- Durra Panel prefabricated strawboard panel flooring as the structural floor under bamboo floors – left over from a commercial project

WINDOWS & GLAZING
- Neuffer Timber Profile Classic double-glazed timber tilt-and-turn windows, U-value 1.1
- Commercial grade clear anodised aluminium-framed double-glazed bifold and sliding doors, U-value 1.9
- Plissee-Experte Monza 1119 insulating honeycomb internal window blinds
- Neuffer insulated external roller shutters for bedroom windows

LIGHTING & ELECTRICAL
- LED lighting throughout, with motion sensors on bathroom and external lights
- One centrally located switch per floor will turn off most power points and lights to minimise energy use
- Skirting board ducting throughout the house allows flexible cabling for future changes and new technology

PAINTS, FINISHES & FLOOR COVERINGS
- AGAR water-based sealer to concrete slab
- Lime wash to the internal and external rendered strawbale walls, plus Crommelin Limestone & Sandstone Sealer to external walls
- Dulux Wash & Wear paints to the internal lightweight and bedroom walls

OTHER ESD FEATURES
- Flexible design with many permutations – a house that can easily adapt to the changing needs of its occupants over a lifetime
- Two families living on one urban block gives a sense of community, shared space and resources, passive safety and security, reduced mortgage and a healthier work-life balance

DESIGNERS AND BUILDERS
Deepti & Christian Wetjen

PROJECT TYPE
New build

LOCATION
Doubleview, WA

COST
$350,000
(in 2012; excluding professional fees)

SIZE
House 170m^2
Land 355m^2

INSIGHTS
"Our vision was to create a compact and adaptable house, maximising useability and flexibility of internal spaces while minimising the overall building footprint; to site the house in an urban setting close to public transport and amenities; and to construct a high quality contemporary building envelope using sustainable concepts and materials."

Christian and Deepti, designers and homeowners