MODERN GREEN HOMES

Sanctuary

ISSUE 75

RENOVATION & RETROFIT SPECIAL

Garage converted to cosy retreat; two rental home upgrades; slow architecture for a fast world; choosing your block & more

SECOND LIFE

Eco homes without starting over

Wilam Ngarrang
Apartment block retrofit ticks all the boxes for tenants

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HOUSE PROFILE
Orange, NSW

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AT A GLANCE

- *Tired, asbestos-laden secondary dwelling retained and retrofitted*
- *Modest footprint unchanged; minor layout changes for flexibility of use*
- *Building envelope comprehensively upgraded for thermal comfort*

Third life

A reuse project from the start, a cottage relocated to an Orange property years ago has had a comprehensive retrofit to Passive House standard – and what a result.

When Ceri and Mark bought their rural block on the outskirts of Orange, New South Wales, in 2020, it had a secondary dwelling that was destined for demolition. The asbestos-clad 1940s cottage had been relocated to the property in the 1990s, having been bequeathed to a charity group to run in-house youth programs. While many would have gone ahead and knocked it down, Mark and Ceri saw the value not just in keeping it but in refurbishing it, and opted to target the Passive House EnerPHit standard for renovations. "We committed to the process without even experiencing a completed Passive House," Ceri says. "The building science makes so much sense."

The original cottage had been well built, but the lean-to tacked on later had not. In addition, there wasn't much insulation, the single-glazed aluminium-framed windows rattled with the wind, and a blower door test conducted in 2023 recorded a huge 32 air changes per hour (ACH). The deep energy retrofit, undertaken by Envirotecture, has seen the old house transformed into a healthy, comfortable, efficient home that performs well through Orange's hot summers and cold winters.

The project focused on improving the envelope by insulating and recladding the outside and upgrading the windows and roof, while keeping the original footprint. "One of our drivers is that we don't necessarily need to make things bigger, we just need to make them better," says Andy Marlow of Envirotecture.

To respect the character of the building, the Envirotecture team retained the external openings in the cottage, changing some of the openings in what was the lean-to to improve the northern solar access and the connection to the deck. They have all been fitted with new uPVC-framed triple-glazed windows and doors.

The asbestos cladding was removed and the structure upgraded from the inside out to preserve the interior plasterwork. "We took everything off from the outside, then we wrapped the building with the internal lining membrane and built outwards from there," says Andy. "There are two 90-millimetre-thick layers of timber-framed wall with woodfibre insulation, an external vapour-permeable membrane, and then battens and cladding." The timber and metal exterior of the former lean-to is a deliberately modern contrast to the original cottage, clad in white Weathertex boards.

Ceri, who is an experienced renovator, started studying interior design during the project to learn more about the technical side. With a particular interest in designing for ageing in place and people living with dementia, she wanted the interior layout to support a variety of needs, life stages and living situations, such as housing two unrelated adults. "For a long time I've been experimenting in my head with how to create the perfect space so that two single, older people can live together, having companionship without being in each other's pockets," she says. She applied flexible and dementia-friendly design principles to the home, as well

Facing page The kitchen is secondhand and was slightly reconfigured and an island bench added. **Right top** The cottage's original horsehair plasterboard linings and plaster decorative details were retained wherever possible. **Right bottom** The laundry/mudroom features joinery of Forbo Furniture Linoleum on a ply substrate, and electric underfloor heating to allow the space to function as a drying room in Orange's wet, cold winters.

Above A new deck connects the cottage much better to its surroundings and provides a sunny outdoor living space with great views.

as the Livable Housing Australia Silver Standard for accessibility and safety.

Internal configuration changes are minimal, with the kitchen, living and dining area opened up and given direct access to the new deck, a couple of doors moved, and storage redesigned. The small second bathroom now functions as an ensuite to one of the bedrooms, and a walk-in robe with built-in desk replaces the cottage's defunct original front door and entry lobby. The original plasterwork on the bedroom walls and ceilings is still intact, a detail the current tenants appreciate: "We love how the cottage has been modernised without destroying what was important about it, like the ornate ceilings," they say. They also remarked on how easy it is to heat and cool the house quickly.

Locally sourced, natural and non-toxic products were used wherever possible. "When it came to fitting out the cottage, my main aim was that everything had to have had a previous life, whether it came from our own house or from friends, or bought on an online secondhand marketplace or something like that," says Ceri. Even the kitchen is secondhand, reconfigured to fit the space and now including an island bench.

With the retrofit complete, the final blower door test recorded an impressive airtightness of 1.02 ACH, and the interior stays mostly between 20 and 25 degrees Celsius year-round without much active heating or cooling. "We fixed the house that looked unfixable," says Andy. "If you were to build a new home to the same standard in this area, it would cost about three times as much. It's a useful lighthouse project, demonstrating that you can retrofit an asbestos-laden little timber and weatherboard cottage and make it really good."

An added benefit of the project was that the team – the builder, electricians, plumbers, other trades and suppliers – learned about and gained experience in the Passive House standard, and the builder, Steve, has since established Paradigm Passivhaus and become a local distributor for Pro Clima building membranes. And armed with the valuable experience gleaned from the cottage, Ceri and Mark will soon be embarking on a deep-energy retrofit of their own brick veneer house nearby. S

LEGEND

1. Entry
2. Bedroom
3. Living
4. Kitchen
5. Dining
6. Bathroom
7. Laundry/mudroom
8. Toilet
9. Walk-in robe
10. Study nook
11. Deck

SPECIFICATIONS

DESIGNER
Envirotecture

BUILDER
Paradigm Passivhaus

PROJECT TYPE
Renovation

LOCATION
Orange, NSW
(Wiradjuri Country)

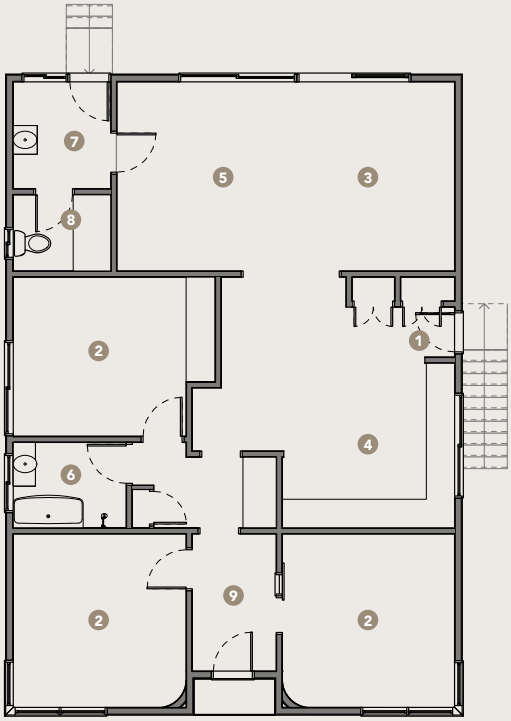
COST
Approx $560,000
Completed 2025

SIZE
House 116m^2
Land approx 6 hectares
(shared with main house)

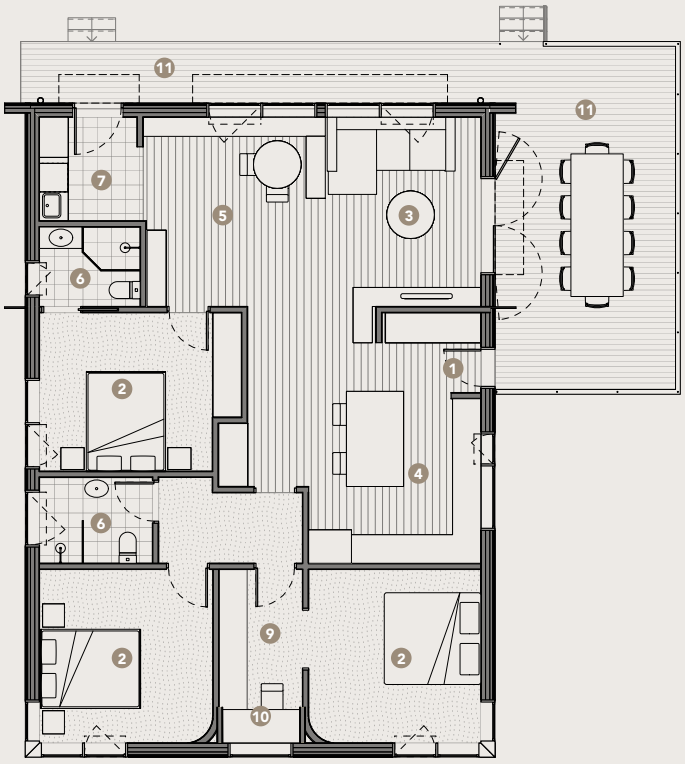
ENERGY RATING
Certified EnerPHit

PASSIVE HOUSE CERTIFIER
Detail Green

PREVIOUS FLOOR PLAN



FINISHED FLOOR PLAN



HOT WATER
- Stiebel Eltron 302L heat pump

RENEWABLE ENERGY
- Cottage shares property's 34kW solar PV system with 25.6kWh battery storage
- Zappi EV charger

WATER SAVING
- Property's 20,000L rainwater storage supplies cottage
- Water-efficient CB Ideal tapware (made in Adelaide) in polished plate brass to avoid chrome

PASSIVE DESIGN, HEATING & COOLING
- North-facing glazing increased for passive solar gain
- Highly airtight and well-insulated building envelope
- Operable windows for natural cross ventilation when desired
- Existing ornamental pear tree retained to shade northern aspect

WINDOWS & GLAZING
- Deceuninck uPVC-framed triple-glazed windows and doors

ACTIVE HEATING, COOLING & VENTILATION
- 2 x Mitsubishi Electric reverse-cycle air conditioners
- Sabik 210 mechanical ventilation with heat recovery (MVHR) from Fantech
- Electric underfloor heating in laundry creates drying space for shoes & coats

BUILDING MATERIALS
- Original timber frame structure augmented with extra timber frame
- Pro Clima Intello internal and Extasana external membranes for airtightness
- Insulation: Fletcher Pink Batts to ceiling (R2.7 between joists plus R6 over), floor (R2.7 between joists) and wall framing (R4.2 total), Steico wood fibre board to exterior walls (R6.8) and roof (R7.4), Kingspan Kooltherm PIR insulation under floor (R4.6)
- Cladding: Weathertex boards to original cottage, standing seam Colorbond and blackbutt to lean-to
- Corrugated Colorbond roof
- Floating engineered timber floor retained from an earlier renovation
- Original horsehair plasterboard linings preserved
- Secondhand kitchen reconfigured and some panels resurfaced with Forbo Furniture Linoleum
- Laundry cabinetry: Forbo Furniture Linoleum on ply substrate, with blackbutt bench
- FSC-certified ironbark decking from Pentarch Timbers

LIGHTING
- LED lighting throughout
- Ceramic light fittings: Fat Shack Vintage

COOKING
- Existing Westinghouse induction cooktop retained and reinstalled

PAINTS, FINISHES & FLOOR COVERINGS
- Haymes paints (very low VOC)
- Bremworth New Zealand wool carpets to bedrooms
- Cutek CD50 to timber

OTHER ESD FEATURES
- Meets Livable Housing Australia Silver level for accessibility and adaptability, for ageing in place, with a focus on dementia-friendly design