

Sanctuary

MODERN GREEN HOMES

ISSUE
68

Inner-city Passive House retrofit; simple farmhouse style in Tassie;
engineered stone off the table; gardening for backyard birdlife

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Offer open to Australian residents. Details page 85

Passive House revival



AT A GLANCE

- Heritage home retrofit achieves EnerPHit certification
- Space and functionality maximised on tight Sydney block
- Rear of house replaced for thermal efficiency
- Quiet haven thanks to airtight design

This 140-year-old terrace in the heart of Sydney has been renovated to meet the most rigorous performance standards.



Above The brick walls and 1980s extension at the rear of the terrace house were removed and replaced with a much better performing structure, and a third level added that is hidden from the street. Right image: Andy Wood

The Sydney suburb of Balmain has seen a lot of changes in recent years, with many heritage terraces and cottages being renovated and modernised while keeping the original streetscape. The decorative facade of this 1884 terrace house gives no hint as to what's now behind: a spacious three-storey family home that's comfortable, healthy and energy-efficient. The house has undergone a refurbishment that meets EnerPHit requirements – the Passive House standard for retrofits. It shows that even old, draughty and mould-prone houses can be transformed to meet rigorous performance standards.

The terrace is home to Nick Sowden

and his family. Nick, who started Sowden Building Solutions in 2005, became a Certified Passive House Builder in 2019. He collaborated with building designer Tracy Graham of Connected Design, with whom he had worked on numerous sustainable residential projects, to redesign his house. The pair consulted with Andy Marlow, director at Passive House specialist Envirotecture, to ensure the project met the EnerPHit goal.

Refurbishing existing buildings can be challenging and complex, and to reflect this, EnerPHit is slightly less stringent than Passive House for new builds. However, retrofits must still achieve airtightness of

less than one air change per hour at 50 pascals pressure, or ACH50 (compared with 0.6 ACH50 for new builds); Nick's house registered an impressive 0.85 ACH50 in its blower door test.

Nick and Tracy's plan for the project involved retrofitting the front of the house and replacing the rear with a new construction. At the front, the existing brick walls and concrete slab floor were treated for mould and rising damp, waterproofed, and lined with wood fibre insulation. The window and door were replaced with double glazing and draught-sealed with brush strips.

The brick walls and 1980s glass-and-

steel addition at the back of the house were removed and the materials recycled. The new timber-framed walls have Steico wood fibre insulation on the outside, Earthwool batts in the studwork, and an airtight layer for a sealed envelope. They're either lime rendered, or battened and clad with Weathertex Weathergroove Natural board that will grey off over time. "The EnerPHit standard required our wall systems to be more complex than normal, and every wall needed a slightly different response depending on its location," explains Tracy.

Besides the Passive House specification, Nick was keen to improve the layout and functionality of the house. Tracy redesigned the interior and added

a third floor to fit both the brief and local planning requirements: the upstairs addition is hidden from the street. The total floor area is now 118 square metres over three levels on the 101-square-metre block, leaving enough space for a courtyard garden.

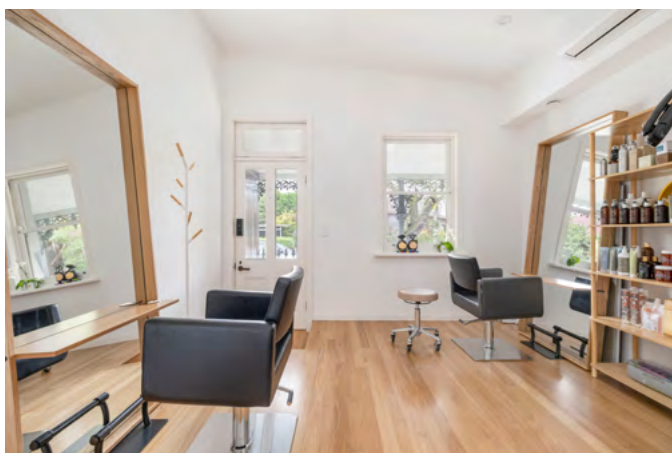
While the main entry to the house is via a side access path to the lower level, the street door of the terrace opens to the middle level, perfect for the front room's current use as a home hairdressing salon. This room could also easily be used as an office, studio or bedroom. Down the hallway, the bathroom has a Japanese cedar bathtub, and the children's bedroom has two east-facing windows with an alcove between, providing privacy and

reducing overlooking.

The ground floor is an open plan living, kitchen and dining area that connects to a Japanese-style garden in the courtyard. New wall systems, thinner than the original brick and steel, create a more spacious room with light filtering through the east- and north-facing double-glazed windows. The large kitchen island and adjacent dining table provide plenty of space for family and guests, and energy-efficient appliances include a downdraft extraction fan integrated with the induction cooktop.

On the new third level, the main bedroom features a small balcony with city views, and there is an ensuite too. All north-facing windows have shading,

Top left and right The lower level has been opened up and now contains a new kitchen and a living space with a wall of built-in joinery. **Bottom left** The front room on the middle level is accessible directly from the street. Currently used as a home hairdressing salon, it could also function as a studio, office or bedroom. **Bottom right** The bathroom features a Japanese cedar bathtub. Image: Andy Wood

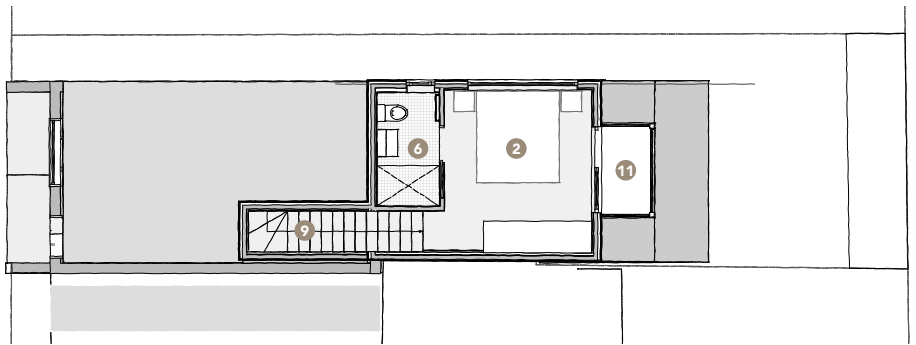


and timber battens diffuse light down the stairwell. “In these terraces, it’s tempting to install skylights to get the same effect, but then you have more serious heat loss and heat gain to contend with,” says Tracy.

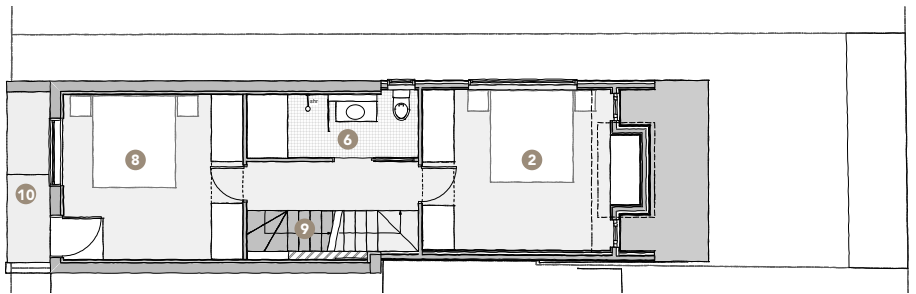
On entering the house, the benefits of the airtight and insulated design are immediately felt. It’s very quiet despite the street traffic, and it’s comfortable and warm, even on a cold day. The mechanical ventilation system with heat recovery keeps fresh air circulating and helps maintain a constant internal temperature between 20 and 25 degrees Celsius, year-round. **S**



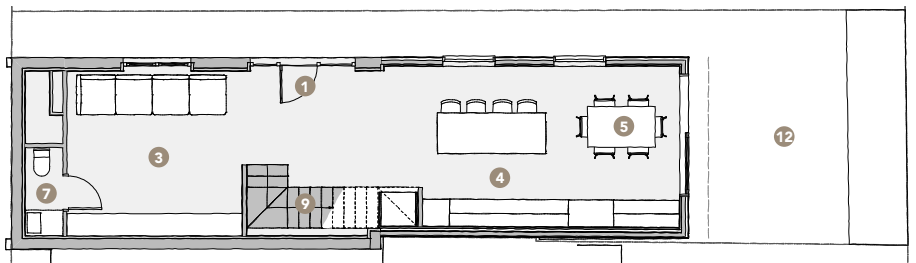
UPPER FLOOR PLAN



MIDDLE FLOOR PLAN



LOWER FLOOR PLAN



LEGEND

- 1 Entry
- 2 Bedroom
- 3 Living
- 4 Kitchen
- 5 Dining
- 6 Bathroom
- 7 Laundry/toilet
- 8 Salon/studio/bedroom
- 9 Stairs
- 10 Verandah
- 11 Balcony
- 12 Courtyard

SPECIFICATIONS

DESIGNER

Tracy Graham,
Connected Design

BUILDER

Nick Sowden,
Sowden Building Solutions
(owner-builder)

PROJECT TYPE

Renovation

LOCATION

Balmain, NSW
(Gadigal Country)

COST

\$970,000
Completed 2023

SIZE

House 118m²
Land 101.2m²

ENERGY RATING

EnerPHit certified

ENERGY ASSESSOR

Luc Plowman, Detail Green

HOT WATER

– Existing Sanden 315L heat pump retained

RENEWABLE ENERGY

– 7.65kW solar PV system from AG Solar, designed for future battery installation

WATER SAVING

– Caroma Urbane 2 tapware and showerheads (WELS 4–6 star)

PASSIVE DESIGN, HEATING & COOLING

- EnerPHit-certified highly insulated and airtight building envelope (airtightness 0.85 ACH50)
- Optimised north-facing glazing with shading for summer, including Heka Hoods steel awnings
- Concrete slab for thermal mass, insulated around perimeter to minimise thermal bridging
- Natural cross and stack ventilation paths designed for effective night purging of heat in summer
- Thermal bridge-free construction
- Ventilated roof and cladding to solve condensation issues

WINDOWS & GLAZING

- Kinzel Industries low-e double-glazed windows with uPVC Aluplast frames and warm edge spacers
- Front door, fanlight window and front sash window retrofitted with double glazing and draught-sealed using Ventrrolla restoration system

LIGHTING

- LED lights from Clipsal
- Custom pendant for island bench made by owner

BUILDING MATERIALS

- FSC-certified timber frame construction to back of house
- Weathertex Weathergroove Natural cladding (PEFC-certified)
- Metroll Colorbond roofing in shale grey colour for lower solar absorption
- Existing concrete slab floor retained to minimise ground works
- Topping slab: Boral Envisia extremely low carbon concrete
- FSC-certified plantation blackbutt flooring, stairs and screens
- Insulation: Knauf Earthwool batts to ceiling (R5); Steico 60mm wood fibre insulation (R1.4) to inside of retained brick walls; Steico 60mm wood fibre insulation (R1.4) and Knauf Earthwool super high density batts (R2.7) to new timber-framed walls; 25mm extruded polystyrene (XPS) insulation around perimeter of existing slab before topping slab poured
- Pro Clima Mento and Extasana external and Intello internal building wraps
- EO Laminex joinery for low VOCs and indoor air quality
- Travertine paving to reduce heat absorption
- Rammed earth-style wall to side boundary made from 80% crushed recycled concrete from a local Boral plant for very low carbon miles

ACTIVE HEATING, COOLING & VENTILATION

- Stiebel Eltron VCR180 mechanical ventilation system with heat recovery
- Daikin multi-head reverse-cycle air conditioners to all three levels

COOKING

- Bora X Pure Induction cooktop with integrated extraction
- Miele electric combination steam oven

PAINTS, FINISHES

& FLOOR COVERINGS

- Keim mineral paints to lime-rendered walls; Royalan to exterior walls and Ecosil ME to interior walls
- Taubmans Pure Performance low-VOC paint to plasterboard walls
- Dulux Weathershield paint to external woodwork
- Bona Traffic to timber floors

OTHER ESD FEATURES

- All-electric house with induction cooking
- All demolition materials sorted and recycled
- Australian-made Japanese-style cedar bathtub
- Low maintenance Japanese garden
- Green Cone solar composter