

MODERN GREEN HOMES

ISSUE 45

Sanctuary

The experimental issue: designs that play with shape, budget, site and style



BACK to BASICS

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WIN

a Stiebel Eltron hot
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About face

This mountain home demonstrates how you can achieve thermal comfort and energy efficiency despite being oriented to the east and unaided by thermal mass.

WORDS Rebecca Gross

PHOTOGRAPHY Barton Taylor





HOUSES TYPICALLY FACE NORTH TO maximise passive solar design, but not all sites are oriented this way. L-House, located in Linden in the Blue Mountains, faces east to expansive views of the bush and city, and therefore required an alternative approach to creating a thermally comfortable house. With high-performance insulation and glazing, a low window-to-wall ratio and evenly distributed skylights, L-House, designed by Alexander Symes Architect (ASA), stays warm in winter and cool in summer while embracing the eastern view.

The clients, Anthea and Ian, moved into a draughty one-bedroom house on the property in 2007. “It was not designed or built for the mountains and was like living in a block of Swiss cheese,” Anthea says. In addition to their cottage, another pavilion served as a guest house and there were footings for a third pavilion, intended to become the main house. Anthea and Ian approached ASA to design a more functional and comfortable house. Done with suffering through cold winters, their chief priority was comfort.

Ian and Anthea originally wanted to maintain the two existing pavilions and create a new dwelling to the east to capture the view. “It felt like this approach wasn’t respecting the site, and the modern building would block the guest pavilion,” Alex says. Instead ASA designed an L-shaped house that retained and linked the existing structures, reusing the forms, services and structures, where possible, to reduce waste and cost. “Anthea and Ian bought the house because they love the landscape. By not building another house, it reduced the footprint of the house on the site, providing more opportunity to appreciate the environment, as well as recycling existing materials and upgrading poor performing dwellings,” Alex explains.

Stripping the pavilions back to their structure and building around them, ASA took a hierarchical approach to materials. Materials remained in situ, where possible; for example, the existing framework. Stripped materials such as the cladding were reused, if possible. This material now lines the soffit on the underside of the



Anthea and Ian’s reimagined house faces east to make the most of bush and city views. High-performance insulation and glazing and a low window-to-wall ratio helps ensure good thermal comfort.



house, and all hardwood was repurposed as feature joinery, sunshades, privacy screens, decking and cladding. Finally, new materials, when needed, were selected to have the lowest embodied energy for their functional purpose. As such, all new internal framing, structure and linings are timber. Fibre cement sheeting is used in wet areas and behind the fireplace, and Zinalume cladding meets bushfire requirements.

“Disassembling and reusing inefficient parts of a building takes conviction by a client and hard work by a contractor, and Blue Eco Homes’ material sorting and reprocessing has led to a very high-quality outcome,” says Alex. Only the bulk insulation, internal plasterboard and single-glazed windows were discarded.

The L-shaped house incorporates the two existing pavilions at the ends of each wing. It is configured with the master suite at the north-eastern end; kitchen, dining and living flowing through the centre of the house, with a deck extending to the east; and two bedrooms in the corner of the L.

A fourth bedroom is above the garage on the western side of the house, and a study and storage area above the two bedrooms.

“A northerly aspect is the most efficient way to create passive design, but you need to celebrate the attributes of the site. By creating this L shape, every functional and liveable room faces east to the view,” says Alex. To offset the easterly aspect, thermal comfort has been achieved with high-performance insulation, glazing and thermally broken aluminium window frames. A lower window-to-wall ratio helps retain heat and skylights allow for natural light throughout the house. Louvres over the deck can be closed to create shade in summer and, come winter, a slow-combustion wood heater warms the living area, with fans circulating the heat around the house. Timber joinery and flooring brings natural colour, texture and grain to the interior, and white-painted timber walls and ceiling reflect sunlight.

Consultant Thermal Environments conducted a NatHERS computer simulation to determine the potential thermal comfort



↑ All windows are thermally broken double-glazed units, and lighting is efficient LED.



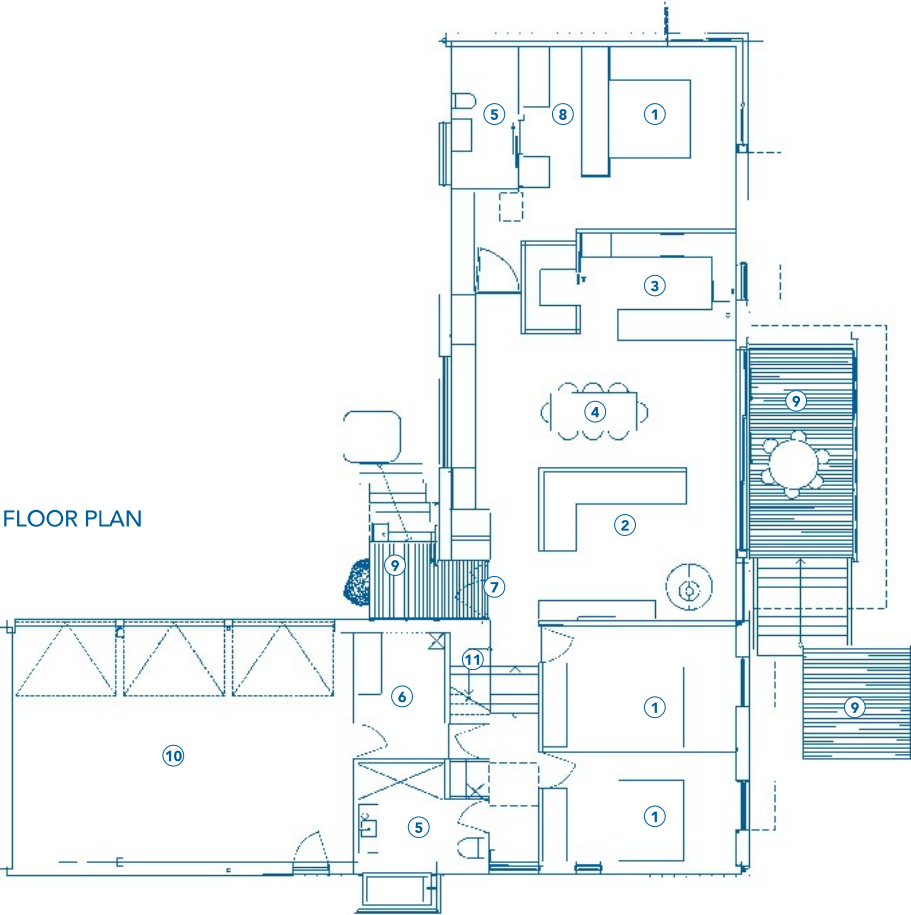
Architect Alex retained as much as possible of the structure of the two existing pavilions on the site, linking them with a cathedral ceiling in the living space. Next to the entry door, stairs lead to a fourth bedroom above the garage and to a study and storage area above the bedrooms in the corner of the L-shaped footprint.





of the home, showing an improvement from 2.9 to 7.6 stars from the original to altered building. This exceeds the minimum 4 Stars required for new detached dwellings in NSW in 2014, when the house was designed and approved, despite being oriented away from the north and unaided by thermal mass. “This improvement is the equivalent of removing four SUVs from the road, and that quantifiable benefit shows how procurement decisions have a real-world outcome,” Alex explains. ⑤

Existing solar panels were relocated to the north-facing garage roof as part of the build. The external cladding is Zincalume to meet bushfire requirements.



- LEGEND
- ① Bedroom
 - ② Living
 - ③ Kitchen
 - ④ Dining
 - ⑤ Bathroom
 - ⑥ Laundry
 - ⑦ Entry
 - ⑧ WIR
 - ⑨ Deck
 - ⑩ Garage (bedroom above)
 - ⑪ Stairs to 4th bedroom, study and storage area

L-house

—Specifications

Credits

DESIGNER

Alexander Symes Architect

BUILDER

Blue Eco Homes

PROJECT TYPE

Renovation

PROJECT LOCATION

Linden, NSW

SIZE

House 237 m²

Site 9500 m²

BUILDING STAR RATING

7.6 Stars (original building was 2.9 Stars)

Sustainable Features

HOT WATER

- Hot water is heated via a solar hot water system with Rheem Loline 325L electric boost.

RENEWABLE ENERGY

- 3kW photovoltaic solar power system (panels re-used from the original house pavilions).

WATER SAVING

- Off-grid for potable and wastewater; all water used is captured off the roof, reused and treated onsite
- Reuse of existing 90,000L concrete rainwater tanks
- Reuse of existing Eco-Max treatment system
- Water-efficient appliances and fittings used to minimise the water consumption.

PASSIVE DESIGN / HEATING & COOLING

- Passive design improves the thermal performance of the existing building pavilions
- High efficiency envelope
- Low window-to-wall ratio; artificial lighting energy minimal during the day due to the evenly distributed window

design in combination with skylights

- Airlock at entry to minimise heat loss in winter when people enter and leave the home
- Cross ventilation oriented to prevailing winds and high-level automated operable skylights to benefit from the stack effect.

ACTIVE HEATING & COOLING

- Re-configuration of existing air conditioner for 1 bedroom home, which was sufficient due to high-performance building envelope
- Ceiling fans installed to limit air conditioning use – Big Ass fans Haiku 2.1m
- Wood-fired heater – Invicta Tipi. Firewood collected onsite from the asset protection zone required under bushfire requirements.

BUILDING MATERIALS

- Reusing the existing two house pavilions contributed to reducing embodied energy of the build
- Predominantly reused

- materials: all hardwood was sorted and stacked for reuse in decking, framing and light features; all cladding sorted and stacked for reuse; privacy screens and airlock, reused timber; reused timber for deck and stair.
- Insulation: roof R7.4 (winter) R8.0 (summer); wall R6.1; Soffit R3.7 (winter) and R4.8 (summer)
- Boral blackbutt floor boards
- Easycraft EasyVJ wall and ceiling linings
- Roof: Lysaght – Longline 305.

WINDOWS & GLAZING

- Glazing is typically AWS ThermalHEART thermally broken aluminium windows with Viridian Energy Tech double-glazed units; (U value 2.5 and SHGC 0.49)
- Skylights: 6 Velux VSE electric skylights
- Horiso venetian blinds.

PAINTS, FINISHES & FLOOR COVERINGS

- Dulux Enviro2 Interior low sheen

LIGHTING

- Low energy lighting, LEDs throughout.

OTHER ESD FEATURES

- Low energy appliances
- House was pressure tested to demonstrate the design vs operation of the building to allow improvements to minimise air infiltration based on the tests
- Efficient use of energy resources to ensure minimal impact on the existing grid.



Reusing the small and leaky original buildings reduced the embodied energy of the build. The house at right has become the main bedroom and kitchen; the house at left was transformed into a garage with a bedroom above. A living area now links the two.

