



## Design Workshop: Growing up



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The house is surrounded by a native garden that awarded homeowners Jill and Wayne runners-up in the New South Wales Tidy Town's sustainable garden challenge a few years ago.

### In New South Wales, Jill and Wayne want their house to grow up rather than out to fit their family of seven more comfortably. Caroline Pidcock of Pidcock Architecture + Sustainability helps them with their design.

Jill and Wayne and their five children have growing pains. Their three bedroom house in Dubbo, New South Wales, is comfortable, has a northerly aspect and is generally a pleasant temperature year-round. But with five growing children and loads of visitors, the family need more space. They don't want to expand to the north and there's no room to the east or west, so the only way is up.

The couple love their northerly aspect. The family and dining rooms are warm on sunny winter days. These rooms overlook their native garden that has been carefully designed to shade the house from summer but not winter sun. It's an established feature they want to retain in their extended home. Most of their living is done

in the kitchen and dining area so Jill and Wayne would like to enlarge these spaces, but separate off a lounge room.

Due to chemical sensitivities in the family, a healthy house is important to them. This means using zero volatile organic compound (VOC) finishes in the new extension. They'd like to use clay-based paints on internal walls, minimise the use of any glues and sealants and use wool or other natural insulation. To create the second storey they plan to use an untreated timber frame and floorboards, plasterboard, and Colorbond or Hebel cladding with coloured render.

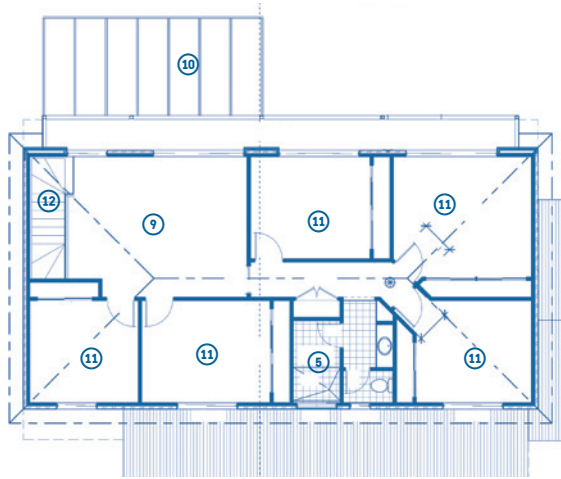
Dubbo has extreme temperatures ranging from intense dry heat in summer to cool temperatures in winter. Evaporative cooling has worked well for the family in summer when temperatures have reached upwards of 40 degrees and they generally run the cooler 24 hours a day for two months of the year. In the new design they would like to use as much passive heating in winter as possible. Currently their wood heater runs for two to three months

a year. Most of the year, however, the house requires no heating or cooling.

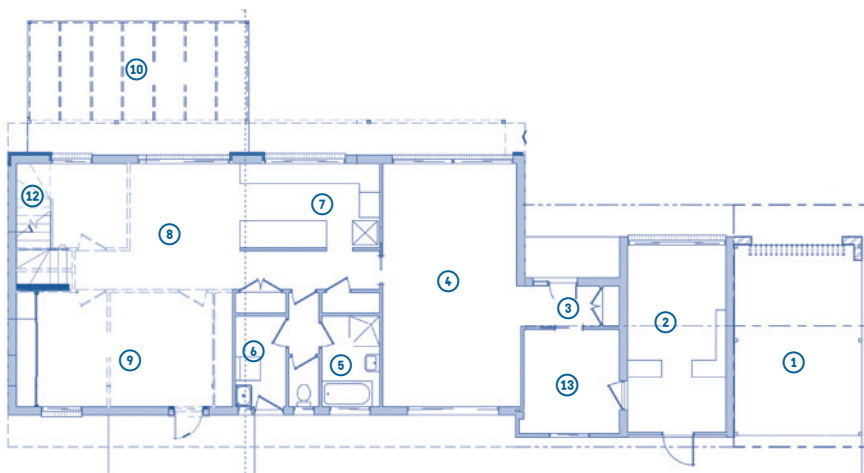
Jill and Wayne have some specific questions for Caroline:

- Is the proposed floor plan optimal?
- What is the best size of the upstairs north-facing windows given there is less thermal mass upstairs? Is there a better way to use the northern aspect?
- Would an open or closed staircase be best? Does it make a difference if it's sealed at the bottom or top?
- Where is the optimal place to put our wood heater? We currently have it on the ground floor at the opposite end of the house to the stairs, but this is not in our main living space.
- Is it better to aim for a north-facing patio area or stick with our south-facing one? We don't want to lose any winter sun into our living areas. The current south-facing verandah is okay but it is cold in winter and gets lots of western evening sun in summer.

JILL AND WAYNE'S PROPOSED FLOOR PLANS



PROPOSED FLOOR PLAN – UPPER LEVEL



PROPOSED FLOOR PLAN – LOWER LEVEL

LEGEND

- ① Carport
- ② Office
- ③ Entry
- ④ Lounge
- ⑤ Bathroom
- ⑥ Laundry
- ⑦ Kitchen
- ⑧ Dining
- ⑨ Family
- ⑩ Pergola
- ⑪ Bedroom
- ⑫ Stairs
- ⑬ Store

**The Brief**

Extend upwards to provide more rooms for a family of seven.

Utilise the house's existing northerly aspect as much as possible.

Minimise energy requirements for winter heating and summer cooling.

Use only natural and healthy materials – zero or low VOC where possible.

Blend the extension with an existing native garden.

**Details**

**PROJECT**  
Extension

**LOCATION**  
Dubbo, NSW

**DESIGNER**  
Andrew Peacock

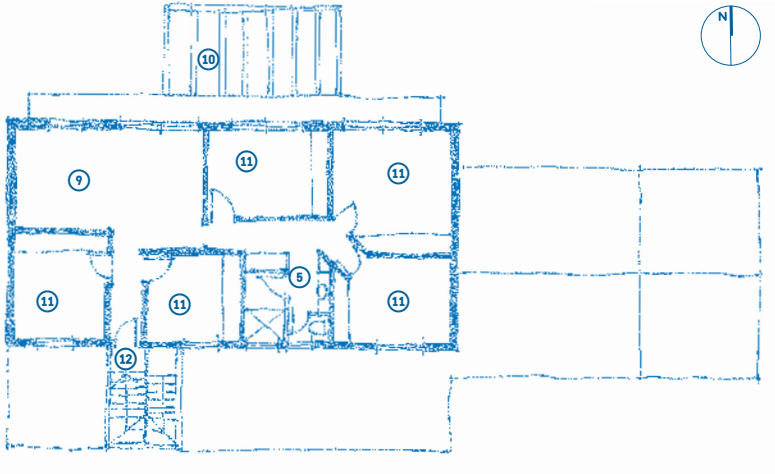
**LAND SIZE**  
1024 sqm

**EXISTING HOUSE SIZE**  
136 sqm

**PROPOSED HOUSE SIZE**  
252 sqm

**BUDGET**  
\$100,000–\$150,000

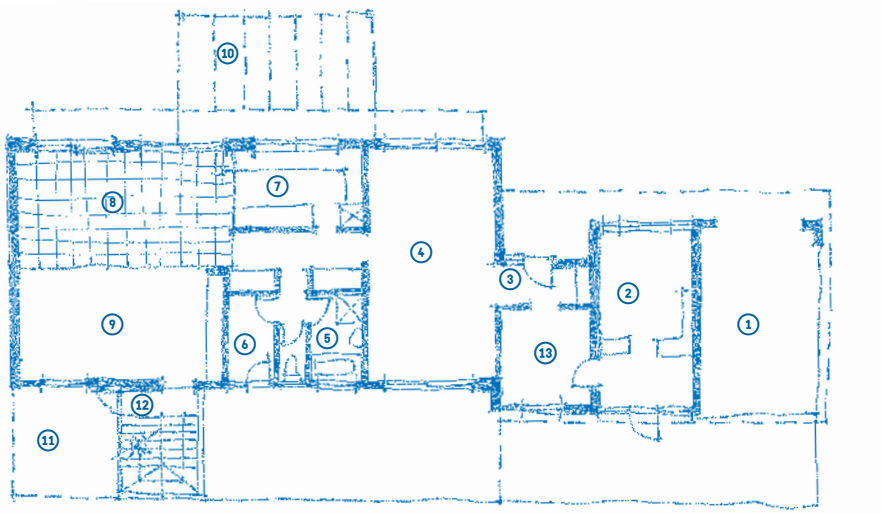
CAROLINE'S PROPOSED FLOOR PLANS



PROPOSED FLOOR PLAN – UPPER LEVEL

COMMENTS

- Add a corridor from the stairs, between the two southern bedrooms.
- Vent heat from the wood heater into the family room.



PROPOSED FLOOR PLAN – LOWER LEVEL

COMMENTS

- Locate stairs to the south
- Situate an additional bedroom downstairs and move window to the western wall.
- Locate fireplace on the western wall and flue up through the family room above.
- Move the pergola to the east in front of the kitchen to let winter sun into the dining room.

LEGEND

- |            |           |
|------------|-----------|
| ① Carport  | ⑦ Kitchen |
| ② Office   | ⑧ Dining  |
| ③ Entry    | ⑨ Family  |
| ④ Lounge   | ⑩ Pergola |
| ⑤ Bathroom | ⑪ Bedroom |
| ⑥ Laundry  | ⑫ Stairs  |
|            | ⑬ Store   |

AN OPEN OR CLOSED STAIRCASE?

An open staircase will lose valuable heat to upper floors in winter and will carry noise from the heart of the house on the ground floor to any bedrooms above.

A closed staircase with well-placed high level windows helps you manage ventilation, natural cooling and lets you acoustically connect (or disconnect) different spaces.

## Caroline's response

Congratulations, Wayne and Jill, on understanding the importance of good orientation and passive design principles in achieving a naturally comfortable home. The additional consideration of non-toxic materials in your home will certainly make it a great place to live. I hope you are able to achieve all that you are after for your current budget, which appears very optimistic.

### IMPROVING THE PROPOSED FLOOR PLAN

As a family of two adults and five children coupled with frequent staying guests and what appears to be the need to work from home, you certainly have high usage requirements for your modest home and additional room is obviously required to manage this. As there is no room to expand to the east or west, and the northerly aspect is rightly highly regarded, your only options to extend are up as you have noted, or possibly to the south.

The current proposed plan extends the western block up directly from the walls below; locates the extended dining room and new upper floor family room to the north; places an unsealed staircase between these living rooms; and occupies the new upper floor with all the bedrooms, an additional three-way bathroom and a one-metre-wide verandah to the north. These decisions are economical and sensible; however, there are a couple of issues that should be considered to help optimise the plan.

Locating all the bedrooms on the upper floor is sensible as it occupies the entire space in this wing and ensures the whole family can sleep near each other. However, I think it would be wise to retain at least one bedroom on the ground floor. This ensures that any family member who might become incapacitated for any period (think broken leg or short-term illness) can be easily accommodated and not have to climb stairs.

The staircase should be able to be closed at both its top and bottom as this will best help you manage thermal and acoustic issues. To make this work well in its proposed location will be difficult to achieve as it will require taking additional area from the dining area and family room above. An alternative would be a staircase on the south side of the building, entered from the family room and a new corridor between bedrooms four and five on the first

floor. These bedrooms would need to be slightly reconfigured to provide the same space they do at the moment. This would provide access to a bedroom on the ground floor. It would also shelter the outdoor covered area on the south from afternoon summer sun.

With regard to changing the existing cork flooring to something with better coupling to the thermal mass of the slab, I would recommend using tiles rather than polished concrete. It is hard to know how the existing slab will shape up once it's uncovered and tiles will be more similar in height to the existing cork. I would consider covering the whole dining room floor in tiles. This will reinforce the sense of the room as a whole and ensure your usage of the room is not impacted by a change in surface material and level.

### OPTIMISING YOUR NORTHERLY ASPECT

Balconies off bedrooms – especially when they are only one metre wide – are unlikely to be used and result in additional expense. To provide access, they require bigger window/door openings – the least thermally efficient sections of the building – that then require larger curtains or blinds.

I would change the balcony to a weather hood over the windows below, to maintain the great shading you currently have, while allowing normal sized windows (and coverings) to the upstairs bedrooms. In addition to improved thermal performance, you will achieve much better flexibility in how the rooms can be furnished.

To improve thermal mass on the upper floor, I would recommend you consider including a phase change material in your timber-framed walls and/or ceilings. [Ed note: Read Dick Clarke's article on phase change materials in *Sanctuary 21* for more information about how these products work and their availability.]

### YOUR WOOD HEATER

If you move the stairs to the south, I would place the wood fire on the western wall of the new dining/family room. You will then be able to flue it up through the new upper family room and add an openable vent to heat this space. It will also enable you to construct an easily accessible wood store on the external wall.

On heating and cooling more generally, to minimise the amount of supplementary heating and cooling you need, you require good passive solar design principles coupled with good active

operational strategies. Passive solar design requires a high performing building envelope (well-insulated and sealed floor, walls, windows and doors and roof) coupled with design strategies that allow solar access in winter and exclude it in summer and well-placed thermal mass. The active strategies involve shutting the envelope down when the external temperatures are uncomfortable (too hot or too cold) and opening it up for cooling when appropriate. You might be able to reduce the time for both the evaporative cooling and wood heating if both approaches are optimised.

### THE PATIO

If properly designed, a north-facing external area is a great asset throughout the year. I agree with your concerns that placing a patio directly off the dining room could impact on valuable solar access for this room. I would consider moving it so that it is located directly in front of the kitchen with an overlap to part of the dining room. This will mean that any obstruction will impact the kitchen, and only a small part of the dining area. It will also allow for greater interaction between the kitchen and outside alfresco dining.

I would also ensure the patio is covered with a deciduous vine as this will shade it in summer but let in winter sun when it loses its leaves. Any other hard area to the north should also either be shaded by a deciduous tree or replaced with ground cover or plants. While this will mean including several non-native plants in your wonderful native garden, I think some exceptions are worthwhile considering you are trying to improve your home's thermal performance. 🌱



Caroline Pidcock is the director of Sydney-based sustainable architecture firm, PIDCOCK Architecture + Sustainability ([pidcock.com.au](http://pidcock.com.au)).

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