

LET THE SUN SHINE IN

Sanctuary readers Toby and Melina are planning a renovation to their dark weatherboard house in Melbourne's inner west, to let in more sun and better connect it to their back garden. Jeremy Spencer, from sustainable design and build company Positive Footprints, gives them some pointers on their design.

"When we bought our 1950s weatherboard house two and a half years ago, it was definitely in need of some TLC after many tough years as a rental property," says Melina. "There is a lot we love about the house: although quite compact, it has four bedrooms and doesn't feel poky. It has a great north facing backyard with plenty of room for chooks, fruit trees and vegies.

"Our main motivation for renovating and extending is to take advantage of the good north aspect at the back, which is currently wasted on the bathroom and laundry. In winter our living room is gloomy and cold and the laundry is bathed in light! We would like our extension to be sympathetic to the original home, and plan to reuse as many materials as possible."

The brief:

- Improve the thermal performance of the house which is currently cold in winter and hot in summer
- Increase natural light penetration into the house in winter
- Link with the backyard without increasing the footprint of the house too much
- Create a new open plan kitchen/dining area with northern aspect
- Retain existing bedrooms and provide a new ensuite to the main bedroom
- Retain the existing living/dining room as a separate living space to maintain a connection to the friendly street
- Character is to be sympathetic to the original house

TOBY & MELINA COMMENT ON THE EXISTING HOUSE PLAN

Bed 1: Corner window and nicely proportioned main bedroom. Plan for ensuite and eventually built-in robe on south wall.

Bed 2: Good child's room, close to main bedroom for getting up to infants at night! The neighbours to the west plan to build a large two-storey dwelling with a double garage along the boundary here. This room may ultimately become a spare room or study.

Bed 3: Currently used as a spare room and sewing room. May become our younger son's room when he is a little older.

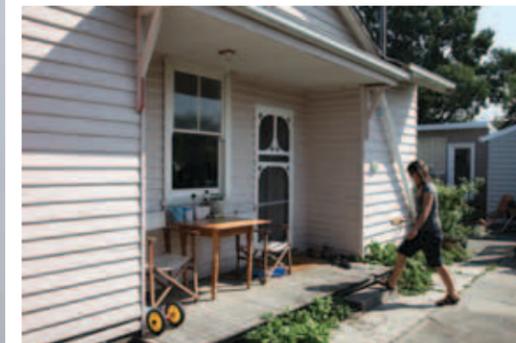
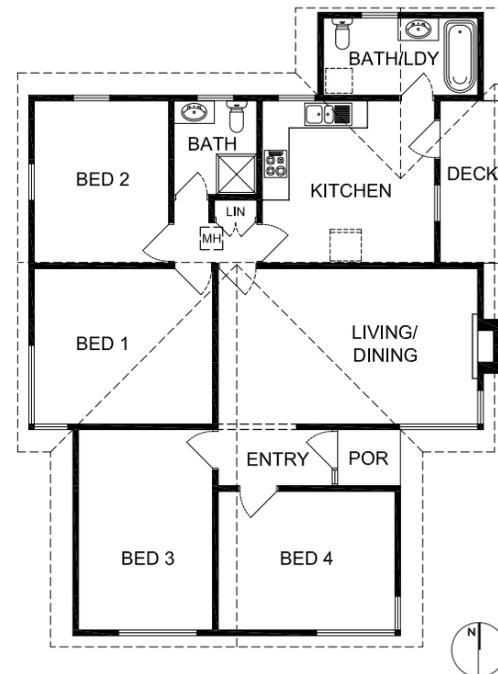
Bed 4: Nice sized room with large corner window. Currently our older son's bedroom.

Living/Dining room: Heated by old gas heater that is quite effective. Nice view to street but corner window mainly south facing, so room can be gloomy in winter. Currently also houses dining table but is cramped.

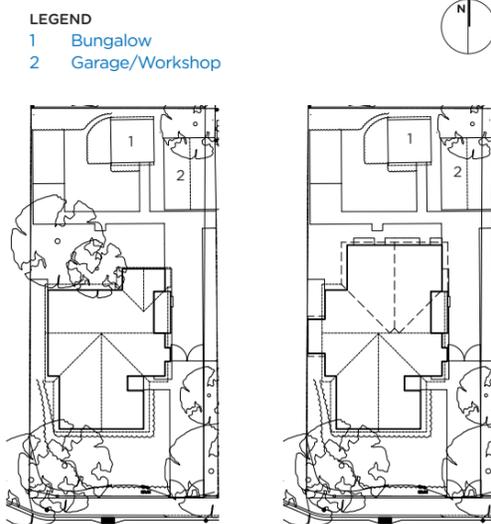
Kitchen: Very small north facing window mostly shaded by cumquat tree. It has old cabinetry that needs to be replaced. The floorboards are in very poor condition.

Bathroom: Poor layout, not enough space to sit on toilet due to shower cubicle. Minimal storage.

Bathroom/Laundry: Taking up valuable space on the northern wall. Bad layout and dodgy fitout: not properly tiled and plastered. We plan to re-enamel and reuse the cast iron bath.



The back garden features a bungalow and a renovated garage that's used as a workshop. Toby and Melina are keen to retain the small east facing porch. "It's just big enough to fit a small table and couple of chairs for breakfast outside in the morning sun." They share the house with their sons Thomas (three) and Lachlan (one).



Existing site plan

The proposed extension will take up a bit more of the back garden. Toby and Melina are prepared to remove the small bungalow if more garden space is required.



NORTH ELEVATION OF PROPOSED RENOVATION

After weighing up their priorities and considering several possible floorplan configurations, Toby and Melina have arrived at a proposed plan that retains the four bedrooms, adds an open plan kitchen/dining area with plenty of windows to the north, and combines the laundry and bathroom to the south of the new kitchen/dining space. They are planning a concrete slab and weatherboard construction, with R2.5 polyester insulation in stud walls and a tile roof to match the existing house, and double glazed windows.



The north-facing, sunny back garden is a favourite feature, but the current house layout doesn't connect well with it. The laundry and bathroom take up most of the north wall.



Corner windows in bedroom four at the front of the house and in the living/dining room let the family stay connected with their friendly neighbourhood, but as they face mostly south, the rooms are dark.

Sanctuary asked Jeremy Spencer of Positive Footprints to take a look at Toby and Melina's proposed plans to ensure they're on the right track.

They also had some specific questions for Jeremy:

- Is the amount of glazing in our proposed design OK, or will we have a "hot box"?
- Should we include high openable windows on the north for extra light?
- What type of underfloor insulation is best to retrofit in the front part of the house (under floorboards with not much clearance), and for the slab?
- We plan to have a polished concrete slab in the new part of the house but are undecided about heating options. Is there any type of underfloor heating we should be considering before laying the slab?
- We plan on using hoop pine ply for joinery; is there a particular supplier for this?
- Are there green options for tiles and bathroom ceramics?
- We'd quite like the extension to match the front of the house, but is there a green option for weatherboards?
- The plans show a fixed horizontal awning directly over the windows, but we are also considering extending this right across the back of the house. Is this wise? What would the optimal size and placement of this awning be?

JEREMY'S DESIGN RESPONSE:

LAYOUT AND SOLAR ACCESS

The current design is a thoughtful response given the brief. Putting living areas (and the majority of windows) to the north is a good strategy to encourage the winter sun into your home, giving you some free heating in winter and high light levels to the new area. The new family room will also provide the visual connection you are after to your rear yard.

The existing living/dining will still need some attention if it is to stop being the "gloomy" room you describe in winter. The easiest way to provide extra light and heat would be by the addition of an efficient skylight

and a solar air heater. A tubular skylight could be mounted to shine somewhere near the middle of the room, and the thermal collector could be placed on the sloped north triangle of roof over the bath/laundry with the warmed air ducted into the room. This would have a similar effect to a large northern clerestory, but would not suffer from the associated night-time heat losses that windows have. Some models also allow venting of hot air in summer. These items could also be easily retrofitted later as funds allow.

INSULATION

The bedrooms are not being touched structurally, so the easiest way to improve thermal performance is through insulation.

Ceilings: If existing ceiling insulation is less than 180mm thick (approximately R3.5 for most insulation types), consider a second layer of insulation over the top. Choose R4.0 for the new ceiling space.

Floors: If there is access under the floors, R2.0 batts stapled either side of the floor joists would make a big difference. Autex (www.autex.com.au) makes 85 per cent recycled PET polyester in an R2.0 roll for just this purpose, but most insulation companies will have a product that will suit.

For the new slab, consider using waffle pods if your soil classification allows. Not only do they add some insulation under the slab (approximately equivalent to R1.0) and generally improve the energy rating, but they may be an economical way to raise the height of the slab to the existing floor level. For recycled content waffle pods try Foamex Diamond Pods with up to 40 per cent recycled content (www.foamex.com.au) or Unipods with up to 25 per cent recycled content (www.unipod.com.au).

Walls: If there is no wall insulation, expanding foam is now available that can be sprayed in through small cuts in the plasterwork between each stud. This can be done as a retrofit as funds allow. Try Ecofoam (www.ecofoamwallinsulation.com.au).

WINDOWS, EAVES AND VENTILATION

I wholly endorse your plan to use double glazing. The most effective double glazing has

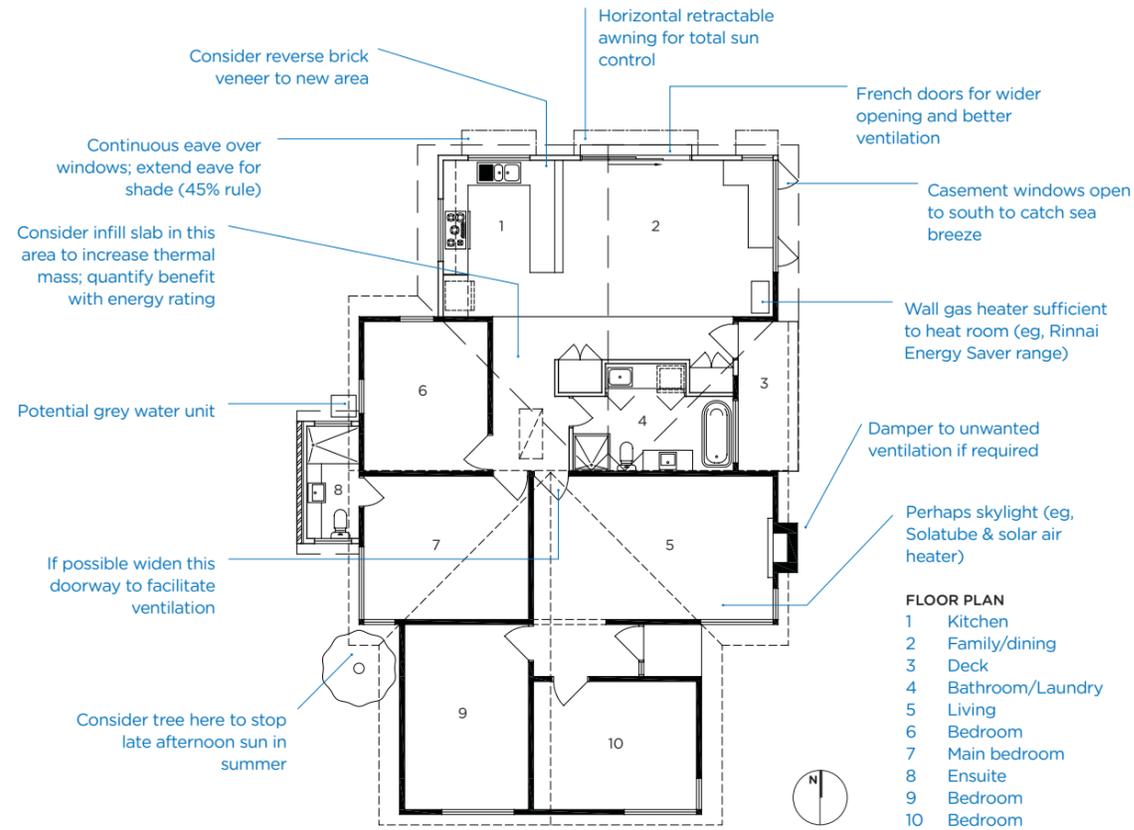
an air space of 14-16mm, so choose windows that have enough frame width to allow for this. If your budget allows I would also recommend the double glazing have a high solar transmission low emissivity (low-e) coating and be filled with argon. Remember windows, even double glazed ones, are thermally the weakest point in your walls, and anything you do to improve them will have a substantial impact on thermal efficiency. The WERS website is a great place to compare the performance of different windows (www.WERS.net).

If you install double glazed windows in the new kitchen/family area, it should perform well in the winter, especially with the dark polished concrete floor to hold the heat gain. As you suggest in your question, the danger is creating a "hot box" in summer. There are several strategies you should consider to counter this:

Windows: Reduce the window area by a couple of square metres. The ratio of window to floor area in the proposed kitchen/family area is slightly high at about 33 per cent (13 square metres of window for 40 square metres of living space = 33 per cent). Conventional wisdom would say that the ratio for double glazed windows in a weatherboard on slab shouldn't be more than 30 per cent. However, this should be checked with an energy rating. The new rating software will be able to tell you the effect of decreasing or even increasing window size. (Sometimes in such renovation projects we actually design areas to slightly over heat in winter, and then use inline fans through the roof space to duct the heat to the colder existing part of the building, so that the new extension is subsidising the underperformance of the old.)

Eaves: Provide more effective eaves, especially to the north windows. The current placement of the eaves directly over the window head means that the tops of the windows will always be in shade and underperforming. In Melbourne the distance of eaves from the top of the window should be at least 30 per cent of the length of the eave to get full sun penetration in winter. Stopping the eaves at the window edges also ensures that at any time other than noon, the sun will come on

PROPOSED HOUSE PLAN WITH JEREMY'S SUGGESTIONS



an angle past the corners of the eave and into the room in summer. A single continuous eave across the back of the house would be much more effective. The length of the eave for Melbourne should be around 45 per cent of the distance from the window sill to the underside of the eave. Above the doors I would consider attaching an adjustable cafe style awning so you can have total sun control and an alfresco dining area in summer. Again, this could be fitted when funds allow. Shading of the western windows throughout will also help summer overheating. External blinds, awnings or deciduous plantings can do the job well. Given that a double storey dwelling is planned for next door to the west, however, it may be worth waiting until it's built to see if you get some free summer shade or not.

Ventilation: In Footscray the summer breeze is usually from the south or southeast and is reasonably cool, having come off Port Phillip Bay. In our practice we always try to

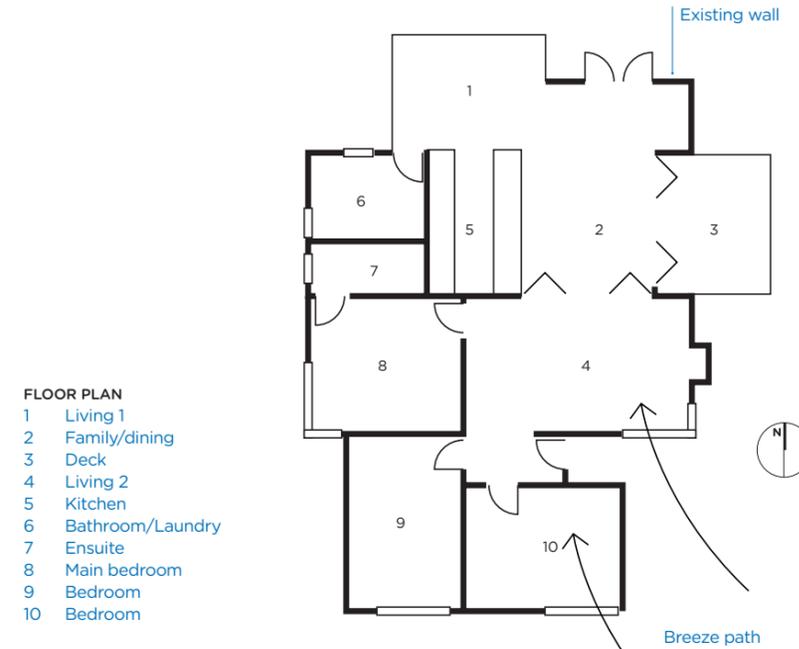
create a breeze path to encourage unimpeded flow through living spaces. This is quite difficult with your proposed design as the existing rooms on the south were not originally created with this in mind. To maximise the airflow in the new family room, I would consider replacing the sliding door with French doors to create a wider opening. I also suggest you use casement (sideways opening) windows hinged to catch the southerly breezes and divert them into the house. You may also want to give some thought to increasing the size of the internal doorway from the existing living to the new area, as it is currently quite narrow and will constrict air movement through this part of the house. (Keep a door though, as it will allow you to zone the heating and cooling.)

THERMAL MASS

Another strategy to increase the performance of the new kitchen/family area and mitigate the need to reduce window size is to increase the

thermal mass. Extra mass will not only increase the heat storing potential in winter, radiating warmth to the living space well into the night, but will also remain cooler for longer in the summer. Combined with summer night purging (opening windows at night) to remove any heat built up during the day, thermal mass is a great strategy for creating a comfortable indoor environment in Melbourne's climate. To introduce more mass, I would consider building with reverse brick veneer for the new extension and for the north wall of the bath/laundry. A single skin of brickwork is laid on the inside of the studwork, and the bricks can be painted, bagged, hard plastered, or left as face brickwork depending on your aesthetic requirements. We often use recycled bricks for this purpose, and have just completed a 9 star house that used this very strategy to achieve its high thermal efficiency.

JEREMY'S ALTERNATIVE FLOORPLAN



MATERIALS

When building a house, through judicious material and appliance selection you have a great opportunity not just to improve the health outcomes and lower the environmental footprint of your own home, but also to move the marketplace in a more sustainable direction as you send large wads of hard earned cash out into the economy. Although we can't go through an entire specification for your project here, I can answer the specific questions you asked about materials:

- **Hoop pine ply for joinery:** try Gunnersens Eo FSC Marine Ply (www.gunnersens.com.au). [Ed note: see also the "Green Kitchen Cabinets" article in Sanctuary 14 for more suppliers of Eo hoop pine ply]
- **Green options for tiles and bathroom ceramics:** Volaré Concepts are distributors for Floor Gres "Ecotech" tiles, made from up to 40 per cent recycled content (www.volare.com.au, www.floorgres.it/default-eng.asp). Ardex make a range of low VOC adhesives and grouts (www.ardexaustralia.com).
- **Green weatherboards:** Consider fibre cement weatherboards such as Scyon Linea by James Hardie (www.scyon.com.au).

They have done a full life cycle assessment on their products and it shows them to be amongst the lowest embodied energy options available. The material is highly durable, and the constituents are highly abundant. Watty Paints also give a 15-year repainting warranty when using Solargard paint with Linea boards - double the standard warranty for timber weatherboards. You could also try Design Pine (www.designpine.com) for plantation-sourced LOSP (Light Organic Solvent Preservative) treated weatherboards.

ALTERNATIVE FLOORPLAN

Although the proposed floor plan is a well considered response to the brief, I have included an alternative one as some food for thought. It has several benefits, but requires giving up one bedroom.

Benefits:

- Increased ventilation pathways throughout the whole house
- Maintains a full connection to the street
- Brightens and warms the existing living area

PROJECT
Renovation and extension

LOCATION
West Footscray, Melbourne, Vic

LAND SIZE
540 sqm

EXISTING HOUSE
110 sqm

PROPOSED HOUSE
140 sqm

BUDGET
\$50,000-\$100,000

- Maintains a bigger backyard
- Connects with both the backyard and your current outdoor dining area
- Groups the wet areas for cheaper plumbing, less water loss down the drains, and less heat loss in plumbing runs
- Flexible spaces
- Smaller footprint, so arguably cheaper

I wish you luck with your project!

Jeremy Spencer is a Builder Consultant at Positive Footprints, a Melbourne-based practice specialising in designing and building leading edge sustainable homes, from environmental retrofits and renovations to new sustainable dwellings.

www.positivefootprints.com.au

Plans and elevations by Darren White of Baseplate Building Design & Drafting

www.baseplate.com.au

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