Towards Sustainable Architecture

The green architect's challenge is to design a building that meets the requirements of the owners and achieves a high level of sustainability. It also must engage with the conditions of the site and not break the bank. Simple, really. Sam Crawford, from Surry Hills, New South Wales, describes his response in one such project.

View from dining room showing original slate roof and chimney through gable end window.

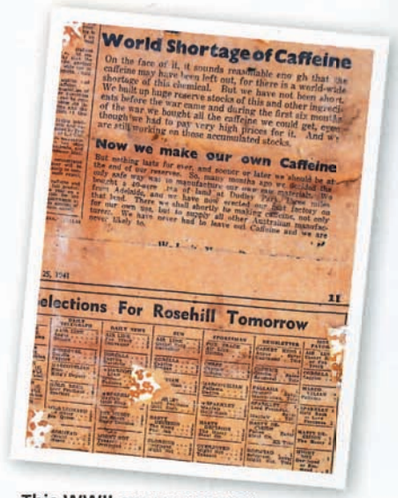
Rear of the site during construction.

Installing water-tanks and underfloor heating in slab.

A KEY objective of our client's design brief was a sustainable outcome. What is sustainability? This is the perennial question for our architectural practice.

Is human occupation of our planet — at current population and standard of living growth rates — sustainable? Quite likely not. So, putting that monumental conundrum aside, what is sustainable or 'green' building practice?

According to contributors to Wikipedia, the "most widely-quoted definition of sustainability and sustainable development is that of the Brundtland Commission of the United Nations: 'sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'"


World Shortage of Caffeine

On the face of it, it sounds reasonable enough that the caffeine may have been left out, for there is a world-wide shortage of this chemical. But we have not been short. We built up huge reserve stocks of this and other ingredients before the war came and during the first six months of the war we bought all the caffeine we could get, even though we had to pay very high prices for it. And we are still working on these accumulated stocks.

Now we make our own Caffeine

But nothing lasts for ever, and sooner or later we should be at the end of our reserves. So, many months ago we decided the only safe way was to manufacture our own raw materials. We purchased a 20-acre site of land at Dudley Park, Fleurieu Peninsula, Adelaide, and we have now erected our first factory on that land. There we shall shortly be making caffeine, not only for our own use, but to supply all other Australian manufacturers. We have never had to leave out Caffeine and we are never likely to.

elections For Rosehill Tomorrow

This WWII era newspaper was found behind some wallpaper.

Office window overlooking courtyard; the window seat offers another small living space.

We can think of there being three competing, and at times mutually reinforcing, pillars of sustainability — environmental, social and economic.

The very act of designing a building is about reconciling competing demands, the most obvious being the needs and desires of the client as against their often limited budget. Yet social and environmental demands are also at the core of any worthwhile design.

Social heritage

This project involves the alteration of a Federation bungalow, in Sydney's Haberfield, to meet the needs of a 21st-century family. Haberfield was the first, and is the best preserved, garden suburb in Australia, giving it great social significance. The social and physical heritage of the house and the suburb is of great importance to our clients. Yet they, like us, also take the view that heritage, like culture, is a living thing, with a past, present, and future. Their occupation, and that of previous owners, is part of the ongoing social heritage of the building.

Hence the history and substance of the house and the lives of its current occupants are incorporated into the new building work: reclaimed framing and flooring timbers, newspaper clippings, steel beams, wallpaper, and the owners' Fijian and Argentinean ancestries are woven into the fabric of the house — into joinery, structure, furniture, wall treatments, sculpture and hearth.

Environmental design

Competing with, and ultimately contributing to, that social pillar of sustainability is the environmental pillar of building sustainability. The existing house, prior to our recent alterations, was anything but environmentally sustainable — cold in winter, hot in summer, with poor ventilation and natural light. The living areas faced south-east. A limited number of operable windows made the house stuffy, dark and damp. We demolished and removed the unworkable rear spaces of the house, retained significant fabric and features, and added living, bathing and work spaces, recycling what fabric we could.

Our progress as humans, working toward sustainability, will depend in part upon innovating greener technologies. Our role as architects is to foster those technologies and encourage their use.

The house now employs both passive and active technologies to achieve environmental sustainability.

First and foremost, passive solar

Office viewed from courtyard, evening.

Our clients describe the house as 'happy', 'authentic' and 'timeless'.

The adjustable slotted screen to the study pod shades late afternoon sun.

design principles are employed to ensure a high level of thermal comfort to occupants. The new living rooms are set away from the original building, separated by courtyards that are pivotal to the design of the house as they provide daylight, winter sun, natural ventilation, and a connection to outdoors from all living spaces. Winter sun can reach the exposed concrete slab floors and reverse brick veneer walls in all living areas, providing significant winter heat gain. Carefully placed sun shades, awnings and roof overhangs prevent summer solar gain. All openings are timber-framed and double-glazed, minimising winter heat loss and summer heat gain. Low-emissivity glazing to all eastern and western windows minimise summer heat gain.

Active measures contributing to long term sustainability of the house include an 18,000-litre water tank under the floor slab, 60 roof-mounted evacuated solar tubes powering in-slab hydronic heating and domestic hot water (with instantaneous natural gas back-up), an 11 kW-hour photovoltaic array offsetting up to 50 per cent of household electricity use, as well as low energy lighting.

Recycled, reclaimed and plantation timbers are used throughout the house, minimising the development's impact on a scarc resource.

Gabled roofs, a requirement of the lo cal council's heritage consultant, provid further opportunity to maximise natural daylight into the living spaces via large high level gable-end windows at three room ends, and a direct line of sight to the original slate roof and jacaranda tree. The pitched roof form, whilst imposed by council, is used to best advantage to cost-effectively provide very large room volumes, and a distinction between served and servant spaces that have relatively low ceilings.

If sustainability is a destination, our practice is taking its early and awkward steps, hopefully in the right direction.

Living room: view through mangi mangi screen to courtyard.

A house to live in

Our clients describe the house as 'happy', 'authentic' and 'timeless'. They say that it felt lived-in the day they moved back in. It gives them, as occupants, a connection to the site, to the breeze, to the trees, that was previously denied them. It provides them thermal comfort at a fraction of the environmental and financial cost of its previous incarnation. It allows them proximity and privacy in shared yet distinct spaces. It is a calm house. It is light and airy, even spacious, yet intimate. It is as cool in summer in the new, more open portions of the house as it is in the old, more enclosed portions. It is warm in reality and sense. The quality of construction and materials means that it will outlast its current occupants.

Is it 'green'? Is it sustainable? We think that it is heading in the right direction.

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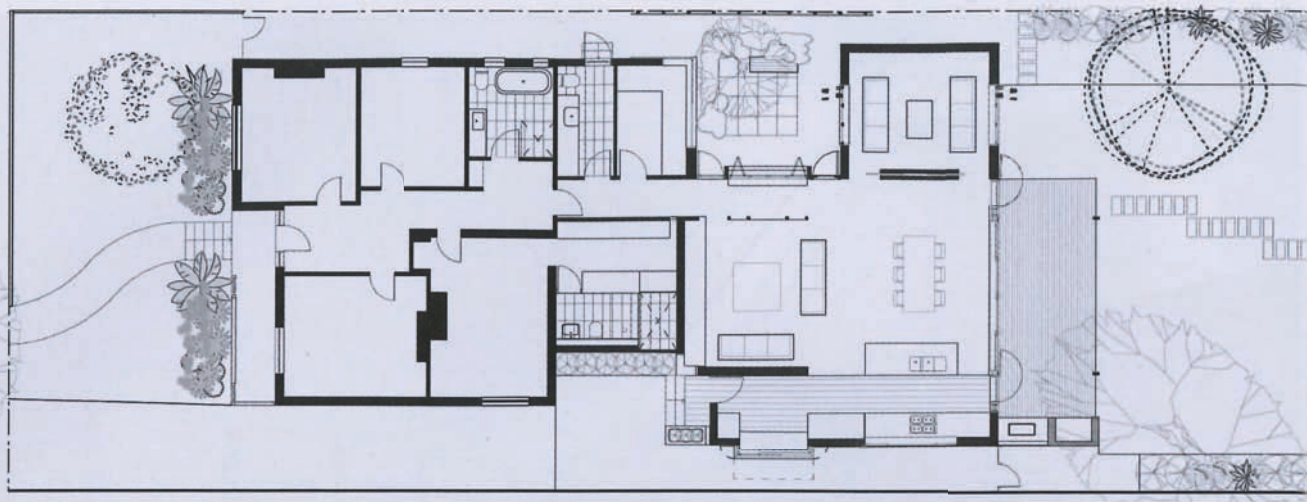
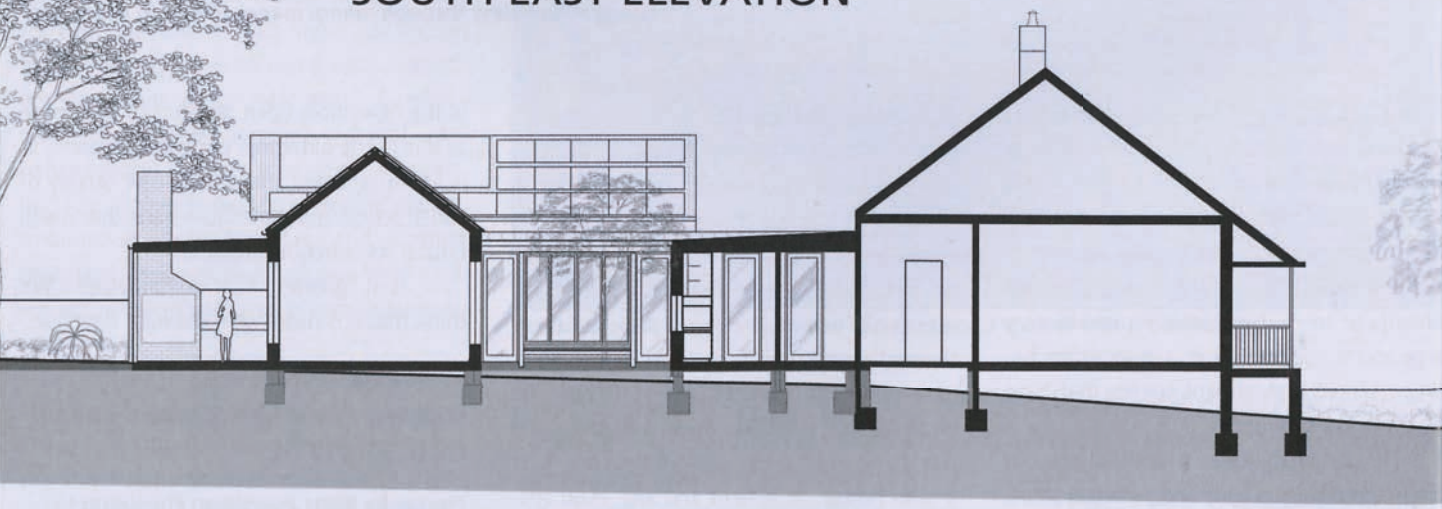
Photos by Brett Boardman Photography, www.brettboardman.com.



FLOOR PLAN

The existing house was cold in winter and hot in summer. The architects demolished the unworkable spaces, and added living, bathing and work spaces, recycling where they could.

SOUTH EAST ELEVATION



SECTION VIEW