

Design for sustainability

BY HELEN WAYLAND

Melbourne has been voted the most liveable city in Australia this year and the second most liveable city in the world. Creating a new children's hospital for this growing, vibrant, and culturally diverse metropolis is a Public Private Partnership (PPP) under the Victorian Government's Partnerships Victoria policy. Under the scheme, the Royal Children's Hospital (RCH; figure 1)—being the public sector—will own and operate the hospital and provide all core clinical services, staffing, teaching, training, and research, while Children's Health Partnership (CHP) finances, designs, constructs, and maintains the new building for a period of 25 years.

The treetop-canopy-inspired design for this family-focused healing environment takes advantage of an extraordinary parkland setting (figure 2). The evidence- and research-based design incorporates carbon-reducing technologies and water capture methods to meet the strong sustainability targets set.

Parkland setting

Spread over more than 10 acres of parkland, a campus arrangement for the new RCH has a manageable low-rise scale to present a friendlier, more welcoming appearance to a child.

Translucent glazed panels reflect the park inside to patient rooms on the north side, while on the western façade more than 1,000 glass "leaves," each six feet wide and three feet high, shade the building from the fierce westerly sun.



Figure 1. The new Royal Children's Hospital, opening in 2011, in its parkland setting, aims for a 40% reduction in carbon emissions.

The subtly colored sunshades evoke the leaves of the parkland's eucalyptus to emulate a treetop canopy as they layer and wrap under the façade. Visitors enter through columns that gives the feeling of being among the trees.

Once the new hospital is complete, much of the old hospital will be demolished and this area will be restored as parkland, with a net gain in vegetation. Throughout construction many significant trees have been retained.

North-south orientation

In a part of the world where six hours of sunlight is a year-round daily average, the design makes the most of natural light. Orientation was the key factor in determining the position of elements within the master plan.

Central to the functioning of the hospital and to the sustainability of the design is a clever wayfinding device: the street (figure 3). Based on the idea that even the smallest country town has its amenities grouped around a central street, this allows visitors and staff an intuitive understanding of where they are in the hospital.

In this model, a large building becomes a community of buildings—an institutional building becomes deinstitutionalised, and each of the parts acquires independent character. The street concept, which connects the campus, is extendable and adaptable. It allows for future organic growth or extra "address points" to be added along the street.

The site has a natural, diagonal fall from east to west, which

means the north-facing street created three levels of gardens around the buildings (figure 4). The entire north-facing wall of the street is glass and provides a lovely vista onto the Great Garden Court, the largest of the sheltered gardens surrounding the hospital. Louvres high in the atrium allow natural ventilation and a thermal labyrinth provides passive heating and cooling for the area.

Melbourne's skyline and park are visible along the street, this serves as a permanent marker for wayfinding and is complemented by memorable internal devices such as a giant aquarium next to the reception desk, which helps direct people to the Emergency Department.



Figure 2. Visitors enter the building via a “treetop canopy” created by more than 1,000 large leaves of shimmering glass, which act as a sunshade for this western façade.

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Water wise

Water conservation is one of the most important issues in a country suffering from an epic drought. The hospital will minimize its use of mains water in a number of ways: consumption will be reduced, water will be recycled where possible, and it will be harvested on-site.

Water-efficient showerheads, taps, and other fittings will be used. Metering with leak detection systems and sophisticated reuse strategies will reduce demand on mains water by more than 20%. There is no evaporative cooling in the plan resulting in reduction in the demand of potable water for water-based building cooling systems. Also a blackwater treatment plant will recycle all appropriate wastewater to flush toilets and water gardens, among other uses.



Figure 3. Oriented north and flooded with daylight, the wayfinding main street has a thermal labyrinth and natural ventilation.

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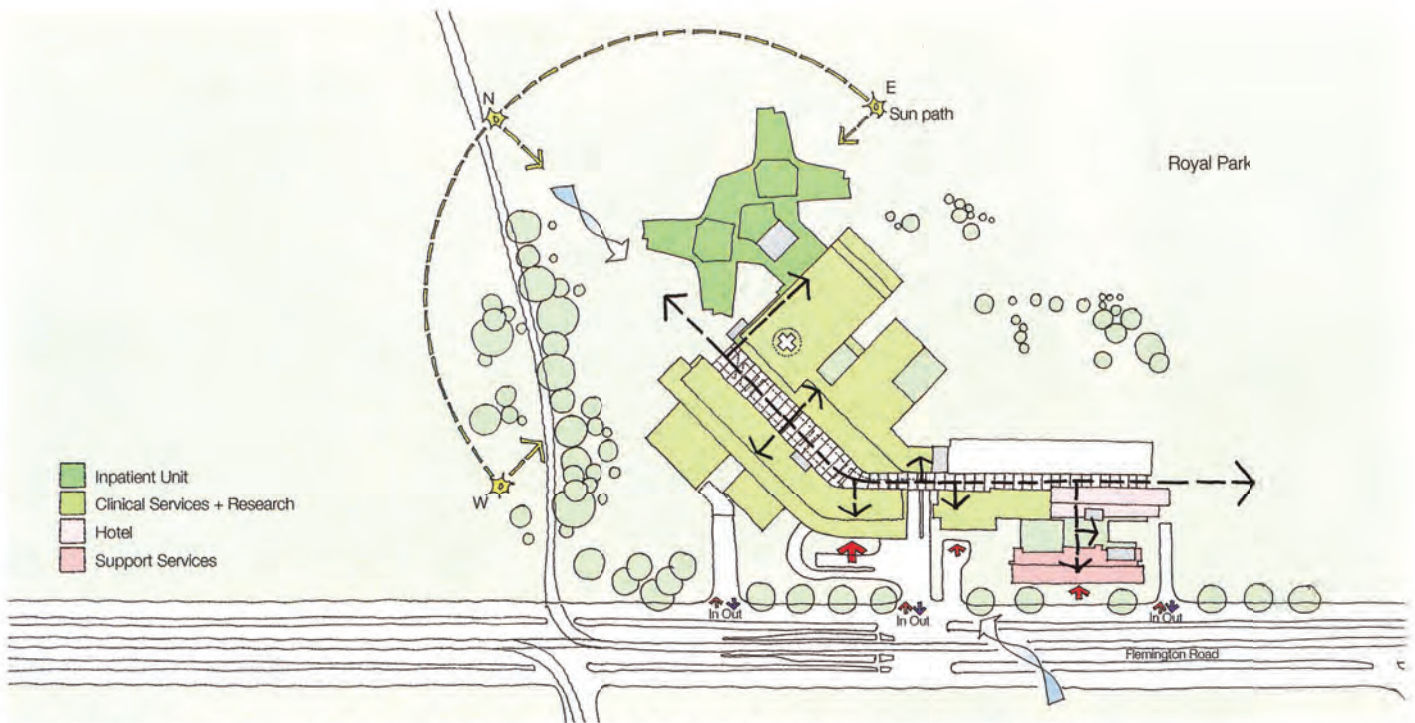


Figure 4. Orienting the street to the north, the most advantageous aspect for all-day sunlight, creates a range of ecological advantages.

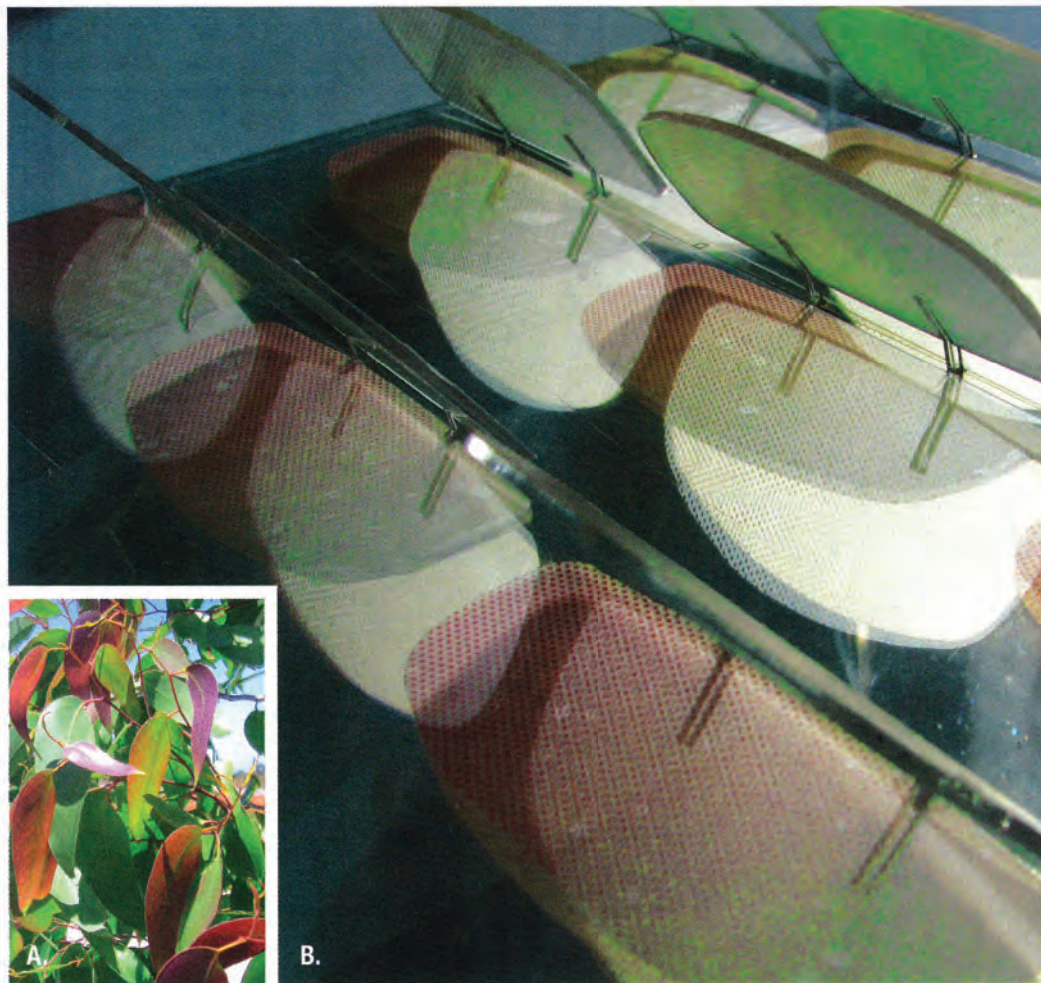


Figure 5. Eucalypts (A) on the site inspire building elements (B) to form an environment designed to heal and nurture.

The plan is for rainwater from at least 75% of the roof area to be collected in storage tanks. The main building folds into its site creating a natural swale around the building, with run-off water harvested for reuse.

In fact, the collection of nonpotable water for reuse in the gardens and parkland is expected to exceed the hospital's needs. There are plans to share this water with the community, notably Melbourne Zoo, a close neighbour.

A smaller carbon footprint

The all-hours nature of a hospital's energy use can, by the incorporation of central energy systems, optimize efficiencies for a dramatic reduction of the carbon footprint. The strategy for lighting, heating, and cooling at the RCH, will achieve up to 40% carbon reduction as compared to a typical hospital.

A trigeneration system will use gas-fired engines to create electricity, a method up to seven times cleaner than the local coal-fired

power station energy—heat is the by-product, allowing it to be used in two ways. Firstly, in conjunction with absorption chillers to create the cooled water used in the cooling systems, and secondly, for heating and hot water.

Solar panels on the roof will also contribute to hot water generation with an estimated 40% of the hot water used in ward areas being created this way. A biomass boiler, which uses waste wood products (not purpose-grown biofuel but genuine waste) is planned and will help with heating, contributing up to a further 10% reduction in carbon emissions for the RCH.

The benefit of a PPP-procured hospital build is that many ecologically sound long-term solutions can be put into place that may not have been possible

in a purely cost-led commercial project.

Family-focused healing

To be genuinely sustainable over the long term, evidence- and research-based design suggests that a hospital has to balance low-energy strategies and high patient comfort initiatives.

Strongly salutogenic, this design addresses the physical, psychological, emotional, and social aspects of a healing environment. Interaction with the surrounding park is maximized (figure 5) and a range of family-focused indoor and outdoor spaces create an imaginative, child-centred environment—on a manageable scale—for every age group. A natural palette of textures and colors brings the landscape inside

Royal Children’s Hospital, Melbourne

Project completion date: December 2011 (stage 1); December 2014 (Stage 2)

Contract Form: Public Private Partnership (PPP)

Client: The Department of Human Services

Architecture: Billard Leece and Bates Smart with HKS

Structural engineering: Irwin Consult

Services and environment engineering: Norman Disney and Young

Quantity surveyor and planning supervision: Bovis Lend Lease

Main contracting: Bovis Lend Lease

Construction cost: AUD \$960 million

Project cost: AUD \$1 billion (approx.)

The new RCH is being delivered as a Private Public Partnership by The Children’s Health Partnership comprising Babcock and Brown, Bovis Lend Lease, and Spotless. Bates Smart in joint venture with Billard Leece Partnership and U.S.-based HKS provided all architecture and design services. For more information visit www.rch.org.au.

with every detail designed for optimum healing outcomes.

In the quietest part of the site, facing north for maximum sunlight, the inpatient unit reaches into the park in long, light-filled buildings. Children in ground-floor beds can look straight into the garden and more than 80% of inpatient rooms have park views. Clever placement of reflective surfaces bring views inside, so that even children confined to a bed can see what’s happening in the garden.

The health of our environment and the health of the people within it are inextricably linked and this project takes a holistic approach to sustainability—environmental, emotional, physical, and psychological.

Sustainability can and should be thought about in broad terms, not only in terms of reducing energy consumption but also encompassing social responsibility and the creation of well-considered, welcoming environments for people.

There is no better way to make the new RCH sustainable than to devise a robust and resilient form

of organization that will stand the test of time. These considerations are central to the environmental sustainability design strategy for the new RCH.

“The curing environment should offer experiences of life and hope. In other words there is no difference between the curing environment and the positive living environment in general,” says architect Juhani Pallasmaa. **HD**

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