

# SUCCESS STORY FOR SOUTH WESTERN SYDNEY

A major milestone in delivering a new era for public health

CLIENT : NSW Health Infrastructure  
PROJECT END VALUE : \$390 Million  
COMPLETION : Late 2012



**In March 2013, Liverpool Hospital will celebrate 200 years of continuous service to the community, but those who built the original three room brick hospital in 1813 could hardly have imagined the state-of-the-art 875 bed facility it has become, complete with 23 operating theatres, helipads and a range of leading edge medical technology including plans for a MRI linear accelerator for cancer research in Australia.**

The most recent evolution of the hospital commenced in late 2005, with a multi-staged design and construction process of a new building, linked via concourse to the existing building constructed in the 1990s, which has also been refurbished.

The first stage of the new clinical building accepted its first patient in November 2010. In October 2012, the purpose-built Ingham Institute of Applied Medical Research was officially opened by the Prime Minister, and there are successive stages yet to come, including a new brain injury centre, new mental health facility, and the commissioning of the 'bunker' for the MRI linear accelerator in 2014.

Other new facilities include a new adult ICU with a capacity for 60 beds, making it one of the largest in the country; 23 new operating theatres; and medical technology infrastructure which exists nowhere else in NSW. This includes the Tomotherapy Unit which combines CT and a linear accelerator that precisely targets cancers without damaging surrounding healthy tissue, and the RAPTOR suite containing a robotic surgical imaging machine, which is the first of its kind in a public hospital in Australia.

Construction is also underway on a new Clinical Skills and Simulation Centre, which will promote teaching and learning across medicine, nursing and allied health. This has been future-proofed in terms of AV and IT technology, and is linked to the University AARNET, allowing staff and students to videoconference with any Australian university, and is also linked by AV to operating theatres.

"This was a major new building for Liverpool, and it has added 2,500 rooms to the hospital," said Liverpool Hospital General Manager, Associate Professor Anthony Schembri. "Our hospital is a principal trauma centre for New South Wales, it has two helipads, and the new helipad is linked by high speed elevator to the ICU, operating theatres, emergency department and cardiac catheter laboratories. We have a specially built theatre for trauma which contains multiple technologies for imaging, and it takes

a matter of minutes now to transfer patients there. In trauma care we talk about 'the Golden Hour', and the new facilities enable us to act swiftly." Approximately 75 different subcontractors worked on the project, which included a number of innovations designed to achieve greater environmental sustainability, better energy efficiency and a healthier indoor environment."

"One of the biggest innovative architectural aspects of the project is the concourse. The main spine links both the old and new parts of the Clinical Building and provides a logical and efficient way for the public and staff to access clinical and consulting areas. The design and final completed element is quite a feature of the hospital with a full height glazed facade and contemporary finishes," said Manager of Capital Works, Matt Sydenham.

"This two storey internal street is fully glazed on the north side to take advantage of soft indirect sunlight. The street overlooks onto a subtle landscaped area that is also accessible to the public. The street is open, with clean light coloured finishes and provides an inviting entry to the hospital. It contains a variety of natural finishes such as glass, steel, wood panelling and granite in a contemporary design.

"Light coloured finishes have been used throughout the new works such as white painted walls, white speckled vinyl floors, white tiles in the bathrooms and light coloured joinery finishes, to maximise light efficiency and provide feeling of wellbeing. Acrylic low-VOC paints have been used throughout the project, to ensure best possible air quality. "The internal integration of the refurbishment to the new building is seamless and the whole clinical building reads as one building. This applies not only to the public areas but also to the staff corridors. There are very little remnants of the previous fitout, so all staff can enjoy a fresh new and up to date facility.

"Artificial grass was laid across large areas of roof on lower levels that could easily be seen from the inpatient unit bedrooms from above, and the design incorporates internal courtyards and light wells to maximise light to consult rooms and offices."

Sustainability innovations include the project's passive solar design, implemented via appropriate external sun shading, double glazing and low e-glazing to improve indoor comfort levels. The new HVAC systems are energy-efficient as are the light fittings, and all taps and water fittings are AAA WELS rated or higher. Work had to be undertaken with great care for the safety of patients, staff and visitors. Specific measures

included a dust proof, vinyl and painted walkway tunnel in the Cancer Centre to provide patients access to treatment facilities; and ongoing construction of fire rated protection hoardings and emergency passage ways, with the staged nature of construction requiring them to be constructed and dismantled around 100 separate times as work shifted around the site.

A 10kPa steel structural gantry was erected over a link walkway to provide protection during crane lifting operations and another has been erected to protect the public during construction of the new cancer treatment bunker. Radio communication protocols were established between the construction site staff and hospital staff in the event of a helicopter emergency delivery, ensuring all tower crane operations would cease.

In the basement, a heavy duty and dust proof hoarding provided protection to the staff corridor and maintain food and linen deliveries from the loading dock to the existing hospital, while the extensive demolition, excavation and structural work took place on the other side of the hoarding to extend the existing Clinical Services Building concourse.

This project also provided an economic injection, as over the course of the project, the Construction manager undertook regular fund raising activities, and raised nearly \$100,000 in donations to the hospital. It has also been an important source of employment to the area, with 1700 workers and over 90 apprentices undertaking their training on the project.

"A real marker for the redevelopment was the clinician and staff engagement in the design. Over 100 change and design groups worked with the architect, designers and builders. We saw this as an opportunity to improve patient care and do things differently, and we all wanted that opportunity to say 'how can we do this better?'" said Anthony Schembri "As a result, the diagnostic imaging centre is on the ground floor – easy for people to get to for appointments – and we have what we call our 'hot floor', which has the theatres, ICU, and interventional radiology. That is just one example of our clinical staff working with the architect, designers and planners to achieve a better outcome.

"The success of the redevelopment has been achieved through communication and collaboration. There is a great pride, not only in our staff but in the entire community. We are so very proud we have Australia's premier hospital serving the community."





## PROVIDING A BREATH OF FRESHER AIR

Hospitals are by definition dedicated to health and wellbeing, and Allstaff NSW have played a role in ensuring indoor air conditions at Liverpool Hospital are ideal for both patients and staff with their refurbishment of the three floors of mechanical services in the existing three storey building.

The \$6.5 million design and construct mechanical services contract included supplying and installing pipework, ductwork and air handling equipment, and also providing specialized testing and commissioning services. In keeping with the high environmental sustainability standards of the project as a whole, Allstaff NSW have ensured that the equipment installed is energy efficient, and that the whole HVAC system is functioning in the best possible way.

The main challenge was managing the multiple staging of works, which was required in order to keep systems operating in the occupied areas of the hospital. "It is a challenge refurbishing a hospital while keeping it functional on a day to day basis," said Allstaff NSW project manager, Andrew Buls.

The works took place over 18 months, and involved an Allstaff NSW team comprising the project manager, up to 3 site managers, a site engineer and two site draftsmen.

Allstaff NSW specialize in mechanical services for health infrastructure and education facilities. Other major projects recently completed include the UNSW Tyree Energy Technologies Building, where they completed a design and construct contract for mechanical services, medical gases and fume cupboards; and they are currently undertaking work at Sydney University for the Charles Perkins Centre (obesity research facility).

The company has been a market leader in Victoria for over 35 years, with the NSW division commencing operation 15 years ago, and now delivering a comprehensive range of services across all major development sectors.

Allstaff NSW provides services including total project management; design and energy efficient solutions; estimating and tendering; drafting; testing, balancing and commissioning. The company also has a Special Projects Division which specializes in retrofits, refurbishments and other small to medium projects.

Their team of professionally qualified, client focused and experienced building services engineers can deliver complete design and construct solutions; existing system assessments and performance evaluations; essential services reviews; and mechanical smoke hazard management systems.

As members of the Green Building Council of Australia and a range of professional organisations including Engineers Australia, the National Environmental Balancing Bureau (NEBB) and CIBSE (Chartered Institute of Building Services Engineers), Allstaff NSW are dedicated to best practice in their industry, and take pride in delivering the most cost-effective, fit-for-purpose solutions for all their clients.

**For more information contact Allstaff Airconditioning (NSW) Pty Ltd,** Quad 2, Level 3, 8 Parkview Drive, Sydney Olympic Park NSW 2127, phone 02 9879 3377, website [www.allstaff.com.au](http://www.allstaff.com.au)

## SUSTAINABLE SYSTEMS CARE FOR EVERYONE

Since Johnson Controls invented the first electric room thermostat back in 1885, they have remained innovators in the field of sustainability technology. A recent success story is the Liverpool Hospital Redevelopment, where the company did double duty designing and installing the Building Management Control System (BMCS) and the leading-edge security system.

The BMCS automatically controls all facets of the HVAC plant, including the chillers, boilers, air handling units, fan coil units and VAV Boxes. An innovative feature is the alarm reporting, which quickly sends emails to those persons directly responsible for that particular equipment.

There were complexities caused by the stringent requirements of a wide variety of specialised areas, including Operating theatres, Negative pressure isolation rooms, Positive pressure isolation rooms, a clean room pharmacy, and a Cyto toxic Pharmacy, plus general ward and office areas.

"The strict pressure regimes of the operating theatres as well as the isolation rooms and cyto toxic pharmacy were the most challenging aspect," said Malcolm Wilson, NSW BAS Team Leader for Johnson Controls.

"I have enjoyed the challenge and take pride in the quality product that my team has delivered. The system we have installed is user friendly and the system graphics are easy to navigate."

There were four milestones with Lend Lease, plus the Ingham health research centre for Richard Crookes Construction. Some stages required significant co-ordination and stringent adherence to deadline, with handovers sometimes occurring one room at a time, making this more logistically complex than a standard hospital project.

The innovative network-based security system for all the new and refurbished buildings consists of three main sub-networks: a Network Based Access Control and Staff Duress System, Network Based CCTV System, and a Network Based Intercom System.

Key elements included installing outdoor cameras, card readers with boom gates, and intercoms for visitor and staff parking. The new access control system separates the staff back of house areas from general public areas, the CCTV system monitors both public areas and back of house, and the intercom system controls public access to locked off areas.

"The main challenge was building and upgrading the refurbished areas with the hospital running within the same areas," said Paul Lovett, NSW Security Systems Team Leader for Johnson Controls

"I have managed other hospitals security installations in past years including St Vincents, and this hospital has raised the level of security and safety of staff and monitoring and controlling of the general public during normal hours and after hours to a new level."

Johnson Controls is a global diversified technology and industrial leader serving customers in more than 150 countries, and a multi-award winning leading provider of equipment, controls and services for heating, ventilating, air-conditioning, refrigeration and security systems. With the ongoing development of new products such as the web-based Metasys BMCS systems, they are dedicated to delivering the innovative solutions which enable sustainability.

**For more information contact Johnson Controls,** Level 2, 65 Epping Rd North Ryde Sydney NSW 2113, phone 02 9805 8300, fax 02 9247 7750, website [www.johnsoncontrols.com.au](http://www.johnsoncontrols.com.au)



## FUTURE PROOFING HEALTH FACILITIES

SCP Consulting is a structural engineering firm with extensive experience in health facilities. They were engaged by Lend Lease in early 2008 to provide structural and civil design services for the Liverpool Hospital redevelopment.

The scope of SCP's engagement was based on the full design and documentation of construction on the new clinical services building (milestone 1), refurbishment of the existing clinical services building (milestone 2), the clinical skills building and the radiation bunker (milestone 3 and 4). Milestone 1 has been completed and opened and milestone 2 to 4 are still under construction.

SCP provided full construction supervision for each milestone along with structural and civil certification of the completed structures.

The new seven storey clinical services building is the centerpiece of the project. The building has a single storey basement structure with a perimeter contiguous shoring system along one side. The basement loading dock turning area has a transfer structure with spans in excess of 16m supporting 6 storey column loads.

The entire structure has a CFA piled foundation to all columns and shafts, and a fully post-tensioned structure from ground floor to roof. This involved over 50 concrete pours.

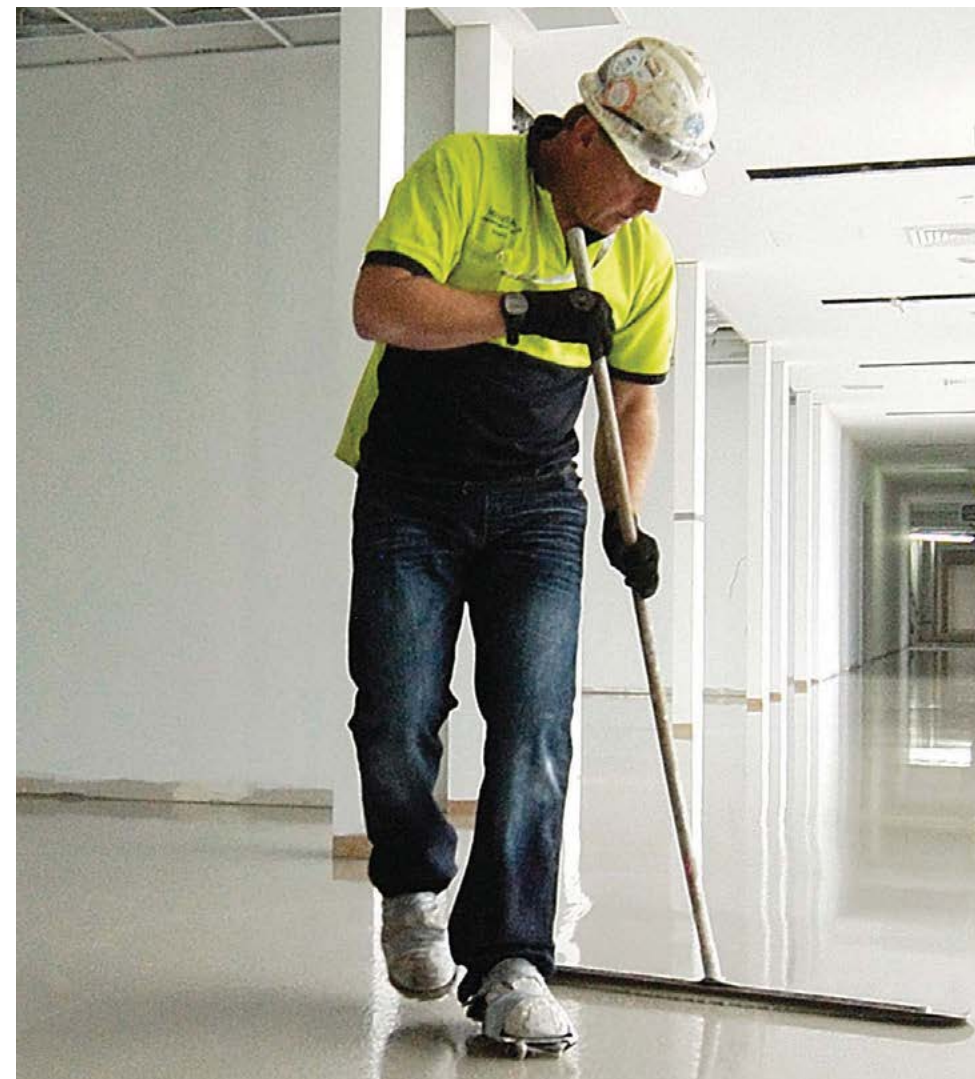
The building is fully tied with delayed tied corbel joints. This allowed SCP to design the building without internal expansion joints. Stair and lift cores were designed to resist lateral earthquake and wind forces without the requirement for additional shear walls. SCP undertook a detailed dynamic analysis and design of all sensitive use areas to ensure that the floor structure would support sensitive equipment and the smooth movement of trolleys and beds over the joints.

Future proofing of the structure involved the incorporation of future penetration zones at columns.

SCP Consulting is currently involved in the construction of the Lifecare cancer treatment centre at Royal Prince Alfred Hospital.

*For more information contact SCP Consulting Pty Ltd, Level 2, Danchen House 507 Kent Street Sydney NSW 2000, phone 02 9267 9312, fax 02 9261 5871, email pauls@scpconsult.com.au*

## ALLSEAL delivers smooth and level floors at new Liverpool Hospital



High-performance self-levelling floor underlayment for use under a range of floor coverings



Allseal Floor Preparations Pty Limited are manufacturers, distributors, and installers of the world's most technologically advanced floor leveling and floor coating products. Allseal brings proven experience to subfloor preparation in all environments including durable and high performance industrial and commercial floors. The treatments they apply can cover most existing surfaces, including concrete, metal, tiles and timber.

Allseal's reputation for quality and precision was a perfect fit when it came to working at Liverpool Hospital. Hospital floors generally require a fall of no greater than 1mm per metre. Medical equipment is highly sensitive. Patients need to be moved comfortably.

To level the floors Allseal used a high performance floor underlayment from BASF Construction Chemicals developed for use over poured in situ and precast concrete floors which will later be covered by carpet, vinyl, ceramic tiles or natural stone. The coating applied was a smooth, self-levelling, cementitious, non-structural, floor underlayment that delivers a fast setting, level and flat surface. It was applied at an average

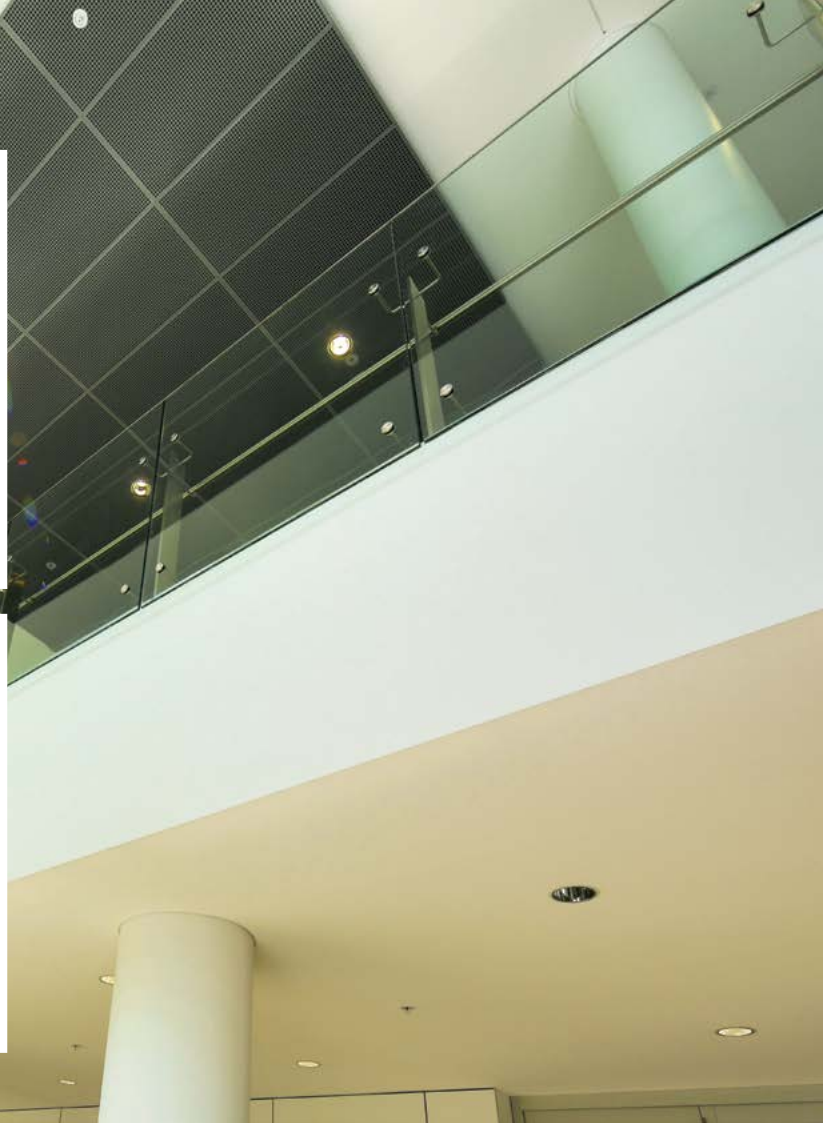
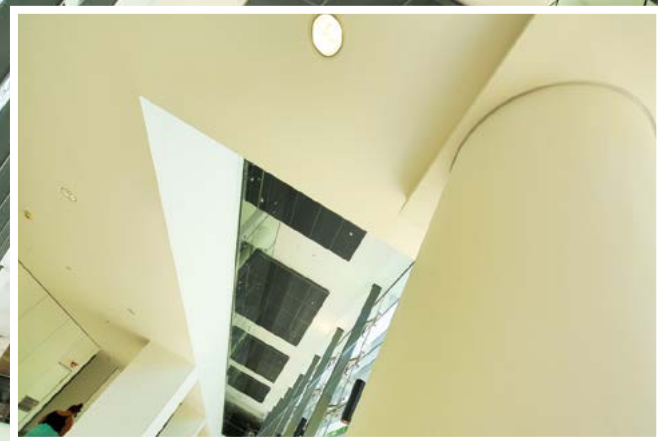
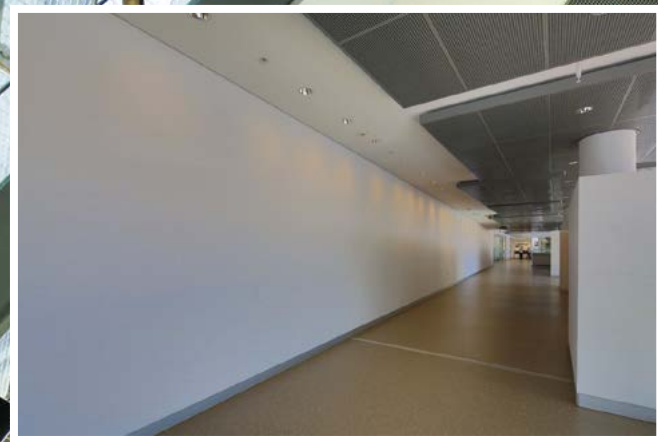
thickness of 8-10mm, to over 50,000m<sup>2</sup> of concrete floor in a 6 storey building, delivering a level floor surface ready for the application of vinyl flooring, tiles and carpet. In areas of critical need, including the hospital's 23 new operating theatres, the floors were laser-levelling and pinned prior to the application

"We're very happy with the results that we've been able to achieve at the Liverpool Hospital," says David Kealy, Managing Director of Allseal. "Most importantly, the client is also very happy with the results. The floors throughout the entire building are level, smooth and up to the required specifications."

In 25 years Allseal has worked hard to build its deserved reputation for quality workmanship and reliability. A large range of technical literature and data sheets is available on request.

*For more information contact Allseal Floor Preparations Pty Limited, P.O.Box 678 Round Corner NSW 2158, phone 02 9894 1608, fax 02 9894 1649, email david@allseal.com.au, website www.allseal.com.au*





## EXPERIENCE AND EXPERTISE DELIVER A HEALTHY FINISH

**Mick's Painting Maintenance Group will always see to the finer details to deliver exceptional results for specific project needs.** For Liverpool Hospital Stage One, to ensure they met the project's high ESD standards they designed a special envirowash system for the project, developed in conjunction with Dulux existing systems to minimise the environmental impact of brush and roller washing.

A team of 65 staff including trade-qualified painters worked on the project, with Senior Project manager Steve Neave managing logistics and overseeing quality-control for the complex 14 month painting works. Mick's Painting Maintenance Group undertook all the internal painting for both the new building and the refurbishment works, using Aqua enamel gloss and low VOC low sheen paints throughout. Part of the QA initiated for this project was the unique method of a non intrusive micron testing of the thickness of paint film on every single surface. This was conducted and verified at each stage with a Dulux Representative –Mr Geoff Holgate

“We are proud of the successful coordination of all the trades on this job,” commented Steve Neave.

For 15 years, Mick's Painting Maintenance Group has been providing premium painting and a diversity of building trade services across the domestic, commercial, industrial and specialist project sectors. With a labour force including more than 85 trade-qualified painters, they are

able to meet the needs of multiple major projects through effective, experienced management of workloads, materials and rostering.

Their tradesmen bring a high standard of professionalism to every job, providing informed suggestions to clients on products, techniques and alternatives. Mick's Painting Maintenance Group are fully insured and licensed, fully compliant and conversant with all the relevant standards, and pro-actively committed to excellence in Workplace Health and safety.

The company are currently working on major projects including 26 Railway Station upgrades (including Heritage paint restoration works) around New South Wales for Railcorp; a six-year \$2.3M contract for the Department of Education and Training for new projects and schools; and a five-year maintenance contract for Spotless worth over \$4 million.

“Mick's Painting Maintenance Group can guarantee the highest level of service, as we have considerable experience in all aspects of our trade. Our Project team can estimate or do take –offs from drawings, work off BOQ's, or undertake site visits anywhere within NSW at short notice,” says Steve Neave.

**For more information contact Mick's Painting Maintenance Group,** Mick Todorovic – Managing Director - phone 0412 354 199, Steve Neave – Senior Project Manager – phone 0431 675 501, Namir Varka –Site manager – phone 0400 822 878



## GARDENS OF DELIGHT

**Birds Landscape Design and Management are a team of designers and horticulturalists who undertake a diverse range of commercial and residential landscape design projects.**

At Liverpool Hospital the company had a number of design objectives. For the streetscape it was important to screen the nearby railway line, soften the scale of the building with vegetation, and to plant hardy, low maintenance species.

In the main entry area durable granite paving created two different surface finishes, aesthetically pleasing and stylish. Along the colonnade large sandstone squares 1.5mx800mm were used to retain the slope between the mental health building and the new wing. An area adjacent to the new wing was specifically designed as a contemplative space for indigenous Australians. This required sensitive and respectful research.

At the heart of the new wing is an internal courtyard. This is not accessible to the public and so was designed freely for purely visual delight.

**For more information contact Birds Landscape Design and Management,** Studio 4, “Regal Gardens Centre”, 249 Annangrove Road Annangrove NSW 2156, mobile 0419 992 634, email [birds@birdsdesign.com.au](mailto:birds@birdsdesign.com.au), website [www.birdsdesign.com.au](http://www.birdsdesign.com.au)

## ADDING THE LIVING DIMENSION

**Giving Liverpool Hospital's surrounds and internal courtyards colour and vitality using a dynamic life-affirming interplay of textures has been an undertaking lasting several years for Regal Innovations.** Regal designed and project managed both hard and soft landscaping elements including earthworks, paving, plantings, walls, steps, handrails, outdoor furniture, children's play equipment, roof gardens, irrigation systems, lighting, fencing and edging.

Specific materials included sandstone for walls up to 900mm high by 700 wide and up to 2m long; granite paving, decomposed granite paving, sandstone paving, freestanding in-situ formed concrete walls, sustainably sourced slatted timber fencing and edging, and energy-efficient LED lights.

“Hospital landscaping needs to be kept fresh and upgraded, because they can be sad and lonely places, so it's uplifting for people to see colours,”

said Regal Innovations Owner and Managing Director, Robert Stanton. His approach to design is founded on sustainability, for example, the sensor-automated rainwater irrigation at Liverpool.

“Anything we can do to recycle materials we do, especially materials from a site like timber, gravel and soil. We will take soil offsite, treat it and ameliorate it, then return it; we crush up old pavers to make base materials,” he said.

Since 1971 Regal Innovations have been adding life to major projects. Other notable examples of their work include Westmead Hospital and Darling Harbour.

**For more information contact Regal Innovations,** P.O. Box 3040, Rouse Hill NSW 2155, phone 02 9679 1177, fax 02 9679 1890, website [www.regalinnovations.com.au](http://www.regalinnovations.com.au)