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Ecolibrium

Pitch Perfect

6 star Green Star, and soccer on the roof to boot.

AIRAH

COVER FEATURE

Pitch

perfect

Exemplifying the evolution of Sydney's "other" CBD, a new 13-storey commercial office tower at 105 Phillip Street has become Parramatta's first 6 Star Green Star building. **Sean McGowan** reports on the innovative new home of the NSW Department of Education.

The City of Parramatta is located approximately 20km west of Sydney's CBD on the banks of the Parramatta River. It encompasses the Parramatta CBD, Parramatta North and the Westmead health and education precinct.

For decades, Parramatta's geographic importance in the growth of Greater Sydney has been identified by both state and local governments, with many state government agencies progressively relocating their workforce to the city.

The Greater Sydney Commission reports that about 700,000m² of commercial office space now exists in Parramatta. There are 82,000 jobs across government and civic administration, business, major health and education institutions and in retail, hospitality and leisure.

And such is the city's transformation from suburban to urban environment, that the local population is projected to increase from 1.3 million to 1.7 million over the next 20 years.

"Greater Parramatta's role as a metropolitan centre is entering a period of transformational change," says the Commission, "driven by an unprecedented level of government and institutional investments into health, education, recreation, culture, entertainment and amenity improvements."

This is reflected in the number of commercial developments – underpinned by both public

105 Phillip St embraces an activity-based working (ABW) fitout.

and private investment – being undertaken in Parramatta.

One such project is the recently completed 13-storey commercial office tower at 105 Phillip Street, developed by Dexus, owned by Charter Hall and leased by the NSW Government's Department of Education.

Designed by architects Bates Smart and constructed by Built, the project has broken new ground in becoming Parramatta's first 6 Star Green Star rated building.

"105 Phillip Street was designed to provide a vertical workspace that meets the needs of a contemporary, functional, flexible and efficient organisation," says Built national sustainability manager Joe Karten.

The development has a strong focus on occupant amenity, including end-of-trip facilities, rooftop recreation space and an activity-based-working (ABW) fitout that features kitchenettes and break-out spaces on each level.

Eleven levels of Property Council of Australia A-grade office space feature rectangular floor plates ranging from 2,160m² to 2,500m², with a set of dual, mixed-mode conference spaces provided on Level 12. The levels are connected by stairs, which promote collaboration for the Department's 1,800 employees and provide flexibility to cater for multiple communities.

The building's structural design, including its southern core, maximises views over the Parramatta River and foreshore, and provides abundant access to daylight.

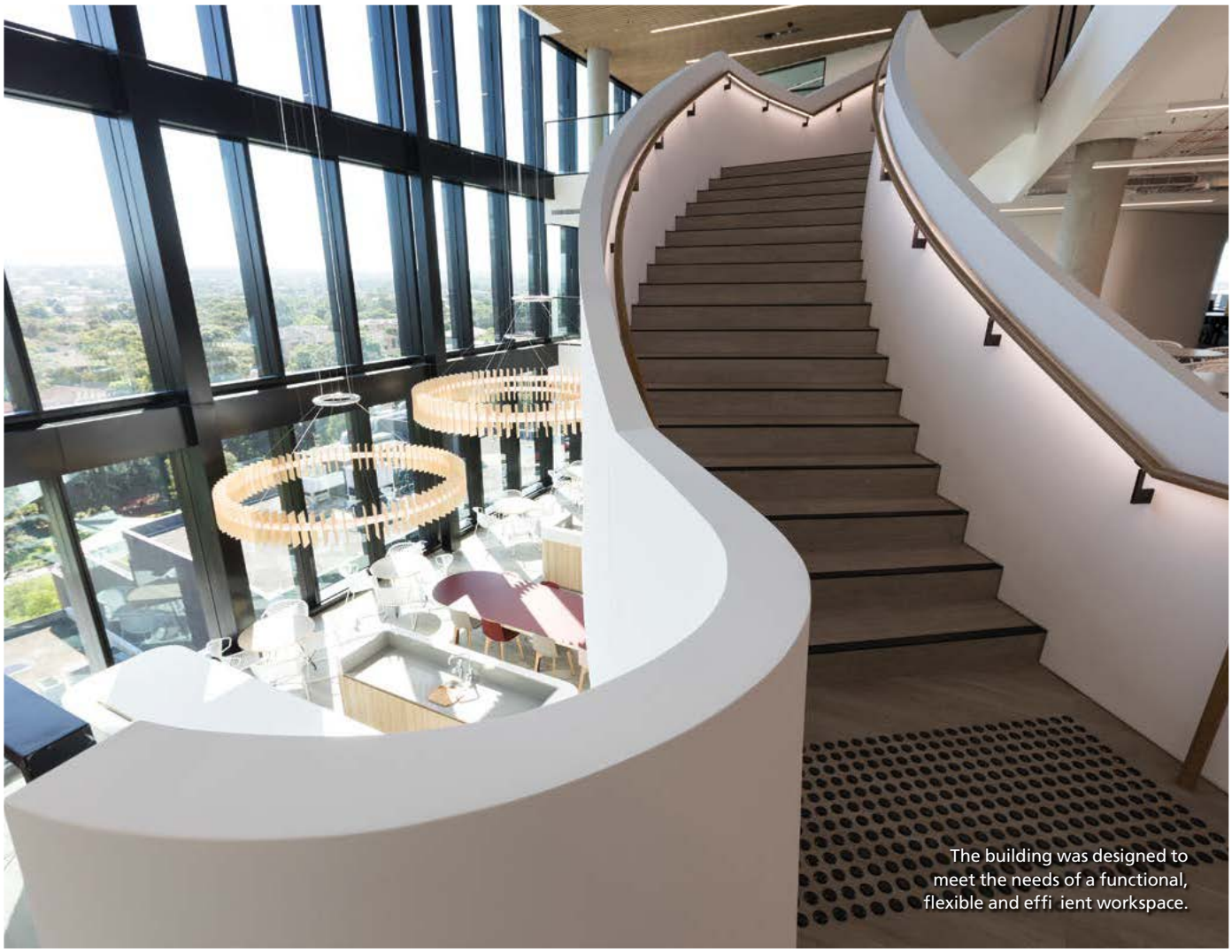
At ground level, an impressive double-height lobby, accessed off Phillip Street, features timber ceilings and access to shared meeting and conference spaces on Level 1. A dramatic sense of arrival has been created with the tower cantilevered above.

BY THE NUMBERS

97.1% The project achieved a 97.1 per cent recycling rate over the course of the demolition and construction activities.

33% Dematerialisation in the form of exposed services, an integrated fitout and a completely re-designed structure enabled the project to reduce steel and concrete use by 33 per cent from the tender design.

1:15 The activity-based working fitout features no-fixed-address desks and workstations at a generous 1:15 occupancy density.



The building was designed to meet the needs of a functional, flexible and effi ient workspace.

The rooftop recreation space is part of a strong focus on occupant amenity.

> After … speaking with the client team, we felt that a 6 Star Green Star pathway was entirely achievable

A fully landscaped thoroughfare with striking bronze sculpture artwork also links Phillip Street to the north, and George Street to the south, replacing the plaza that previously existed on the site.

THE PATH TO GREEN STAR

Wood & Grieve Engineers (now part of Stantec) was engaged by Built to deliver Green Star, BCA Section J, NABERS Energy and NABERS Water consultancy services on the project, as well as NABERS Tenancy Energy services for the fitout.

Joining the project during the latter part (70 per cent design) of the design stage, WGE worked collaboratively with Built to continually test, refine and challenge the assumptions around ESD in the design.

"The project was originally targeting a 5 Star Green Star rating, as well as 5 Star NABERS Energy and 4 Star NABERS Water ratings," says WGE sustainability project engineer, Alexander Kobler. "However. WGE and Built felt more could be achieved,"

"After reviewing the design and speaking with the client team, we felt that a 6 Star Green Star pathway was entirely achievable."

While the Innovation points claimed were already built into the design, the initial pathway hadn't sufficiently sought recognition for each of these features.

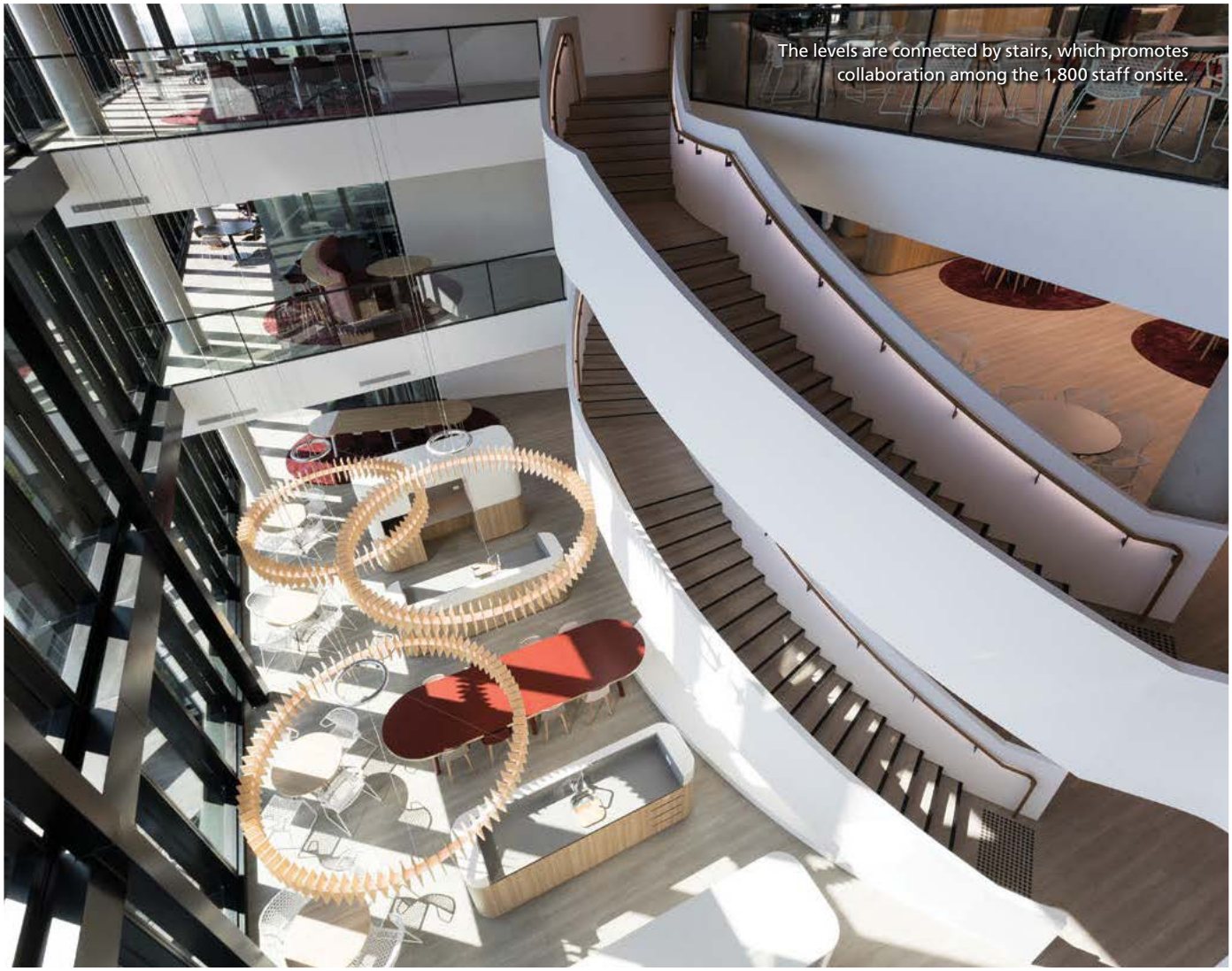
"Collaboration was key to the success of the 6 Star Green Star pathway, and through working closely with Built we were able to compile a list of alternative and additional credits," Kobler says.

These included the opportunity to replace the majority of the Green Star Materials category with the Life Cycle Impacts credit from Green Star – Design & As-Built v1.1.

"This freed up the Innovation category to claim initiatives that both exceeded Green Star – Office Design v3 benchmarks and considered environmental issues outside the scope of the rating tool," adds Karten.

The original design had also considered air-cooled systems on each floor. A water-cooled centralised system was tested for feasibility, and was proven to be a spatially efficient, less energy-intensive and cost-competitive solution.

This led to the 70 per cent completed mechanical services design, used for tender, to be completely changed to incorporate the water-based, centralised cooling system.



The levels are connected by stairs, which promotes collaboration among the 1,800 staff onsite.

"This was able to have minimal impact on the floorplate by completely redesigning the core, at an improved efficiency and reduced cost – proving that innovation is available at every part of the building, at any stage," says Kobler.

Throughout this collaborative process, the elements of user comfort, energy efficiency, water consumption, aesthetics and spatial allowance were continually questioned and resolved to ensure the optimum outcome.

"This could only be achieved through a builder with a passion for driving a sustainable outcome, a willing client," he says, "and a team that was committed to delivering a functional outcome."

> A water-cooled centralised system was … proven to be a spatially efficient, less energy-intensive and cost-competitive solution

SELECTING VAV

A low-temperature VAV (variable air volume) system was selected for 105 Phillip Street, deemed as being the most appropriate for the Parramatta climate.

The design team was able to demonstrate that a centralised system would be far more efficient than a floor-by-floor system. This meant the HVAC solution's energy consumption was able to be reduced while functionality remained unaffected.

To ensure comfort was maintained within the fitout layouts of each floor, localised duct heaters were introduced to allow a predicted mean vote (PMV) of +/- 0.5 to each zone.

"This HVAC design provides traditional comfort parameters across the open floor fitout," says Kobler. "Additional outdoor air has been provided to the perimeter of the building, along with additional cooling capacity to allow the perimeter of the building to accommodate more people than the base building allowance of one person per 10m^2."

He says this additional air also ensures low-CO_2 concentration, provides ideal comfort conditions and delivers a high-quality work environment regardless of the number of occupants in the space.

The three chillers supplying the low-temperature VAV system were located in the building's Level 12 plant room along with two hot water heaters.

LESSONS FROM THE BUILDER

Built's national sustainability manager, Joe Karten, shares some of the highlights of the 105 Phillip Street project.

In particular, he says rethinking and revisiting old assumptions and solutions that had been previously developed (a legacy of old constraints and conventional thinking) led to:

- Obtaining full recognition within the life-cycle assessment of the significant structural dematerialisation realised through the application of pre-cast planks.
- Additional height available within approved planning height allowed the creation of a two-storey rooftop plantroom. This yielded significant savings in mechanical system costs and the relocation of on-floor amenities for NLA gains.
- Contrary to initial concerns of occupant acceptance, the application of 5L/min showers and 2L/min taps has led to a greater than 50 per cent reduction in tenant amenity potable water usage over standard practice. Even with an avid occupant cyclist culture in the building, there have been no complaints raised around water pressure. This demonstrates the ability to challenge current standards to achieve more sustainable outcomes.

The heat rejection plant, made up of four cooling towers, was located within a double-storey rooftop plantroom.

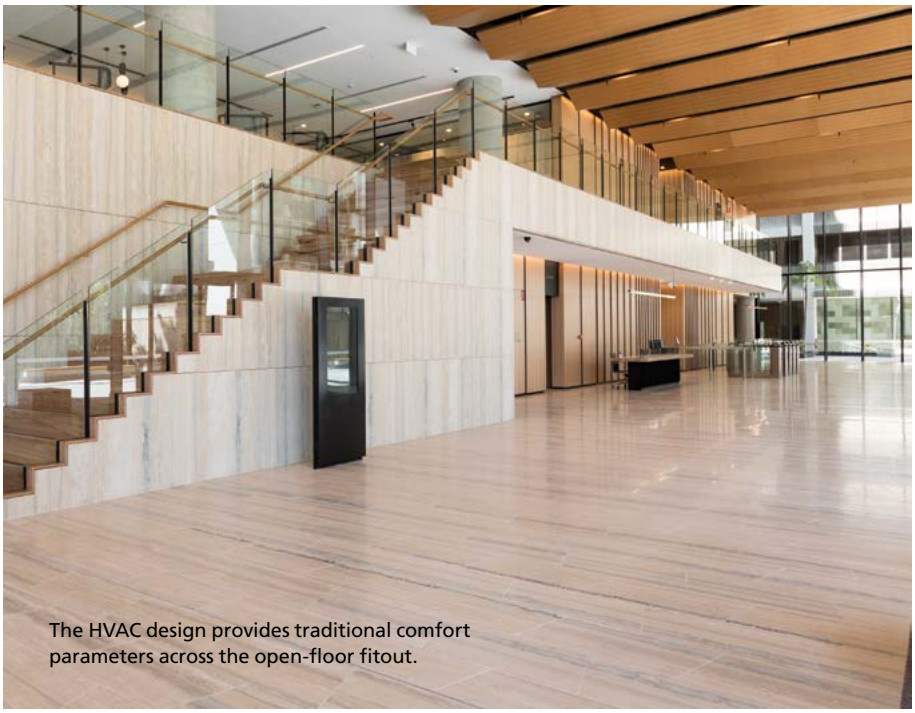
CONNECTED SPACES

The fitout design brief called for the creation of a modern work environment with state-of-the-art finishes, an A-grade architectural feel, enhanced technology and occupant engagement.

To achieve this, a significant area of each floorplate has been dedicated to break-out spaces and non-work stations for collaboration and socialisation, while meeting rooms fitted with cutting-edge AV equipment provide users with privacy as required.

A vertical workspace was created via a series of interconnecting, curved structural steel stairs that connects three levels of the fitout at a time.

"The free address of activity-based working allows tenants to choose a local environment of their liking, to meet their own lighting, temperature and companion preferences and promote maximum productivity," says Kobler.



The HVAC design provides traditional comfort parameters across the open-floor fitout.

Careful selection of mechanical services equipment, such as high-efficiency lifts, and strict controls over lighting, equipment, the use of efficient laptops and IT policies all contribute to the building's energy efficiency.

The building's façade features high-performance, low-e and low-iron double-glazed units. These provide greater clarity and colour rendering to ensure daylight maintains its natural feel and glow across the office space.

Kobler says a combination of this natural light and a state-of-the-art lighting design has reduced the lighting power density to <4W/m². Blinds are installed to manage energy and glare to the tenant's specification.

LESSONS FROM THE CONSULTANT

Wood & Grieve Engineer's sustainability project engineer, Alexander Kobler, shares three lessons from the 105 Phillip Street project.

Great sustainability outcomes can be realised by continually challenging the design assumptions, and looking for opportunities to reduce consumption through passive design elements.

A significant cost premium is not required to deliver a high-quality, great building in line with current best-practice standards. 6 Star Green Star and high NABERS ratings can be achieved through having a passionate, committed team continually looking to challenge standard practice and produce alternate solutions to everyday problems.

A strong commissioning process is required to ensure smooth and efficient operation of the building. The energy and water use almost halved over the first three months due to plant inefficiencies being rectified. By addressing these, the building was able to perform to its designed ability.

A high-quality building can be delivered without a significant cost premium.

RAINWATER IN COOLING TOWERS

In an effort to further reduce the building's potable water consumption, rainwater collected from the 105 Phillip Street building is being diverted for use in the cooling towers.

"Given the limited frequency and increased intensity of rain events, the priority was to ensure captured rainwater was used as quickly as possible to return space to the tank to capture more rainwater," says Built national sustainability manager Joe Karten.

To ensure chemical and microbial build-up is avoided, brominators have been used in the cooling tower water-dosing process.

"The non-potable water could be used for heat rejection, without the need for human interaction, as is traditionally the case," says Kobler.

Though he says there are precedents in Sydney, 105 Phillip Street is one of only a handful of projects that have chosen to adopt this solution.

"As cooling towers typically consume significantly more water than toilets, urinals and irrigation combined," Karten says, "this was seen as an appropriate design solution to the problem at hand."

> The design of the rooftop space encourages all occupants to come together and informally socialise

"The fitout design was modelled to demonstrate an energy consumption estimation exceeding 5 Star NABERS Energy – far exceeding the minimum government requirements for a new fitout," he says.

ACTIVITY FOCUSED

As is common in most new, high-performing commercial office buildings, end-of-trip facilities are a key feature at 105 Phillip Street.

In line with Property Council of Australia A-grade requirements, the hotel-like end-of-trip facilities include change rooms, showers, lockers and bicycle racks designed to be numerous enough to encourage Department staff to adopt alternative travel to and from work.

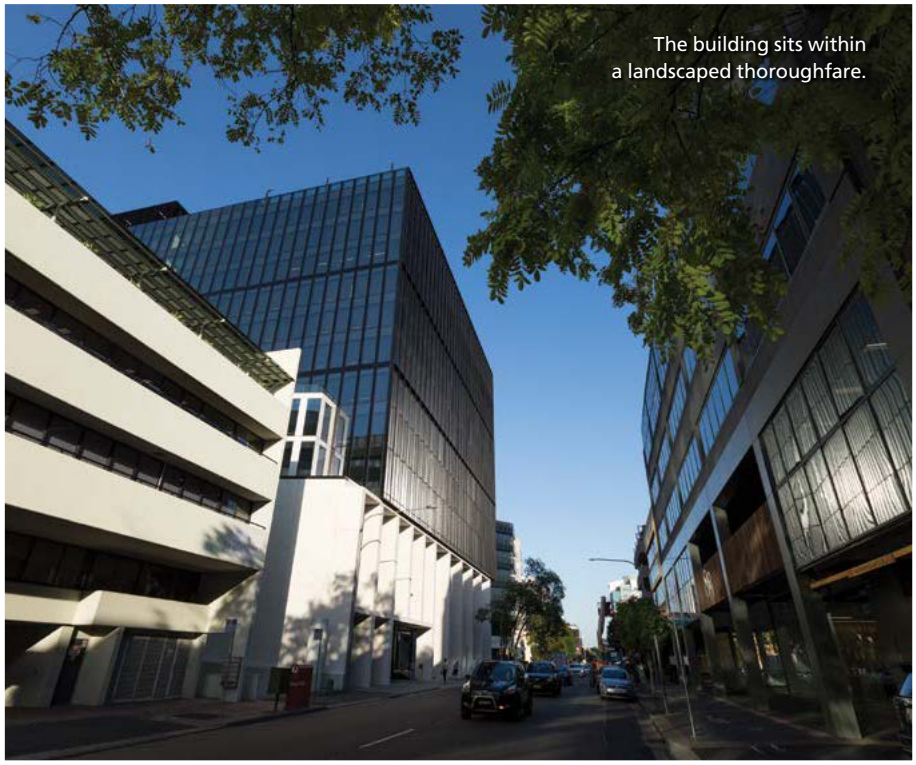
The selection of low-flow water fixtures and toilets throughout the building contribute to a reduction in potable water consumption.

"The 2L/min sensor taps were WELS-tested specifically for this building, and have contributed to an overall water efficiency strategy in line with best practice," says Karten.

The building is forecast to achieve a near 4.5 Star NABERS Water rating at full occupancy.

"Water consumption has been significantly reduced across the tuning period, carried out in the first 12 months of the project," says Kobler. "This process, which has included the client, their commissioning team, contractors and the sustainability team, has ensured the NABERS outcome for the building will be a demonstration of leading practice in Australia."

Rounding out the building's occupant amenity offering is an expansive communal rooftop terrace featuring outdoor dining areas and 5-a-side soccer and sports pitch.



The building sits within a landscaped thoroughfare.

"The design of the rooftop space encourages all occupants to come together and informally socialise," says Kobler. "It provides the perfect oasis for social cohesion, encourages fitness, and provides a place to take in some fresh air and relaxation 50m above Parramatta's busy streetscape."

105 Phillip Street reached practical completion in April 2018, 10 weeks ahead of schedule, with the Department of Education taking occupancy soon after. During the 12-month tuning period, all systems were properly commissioned and tuned to maximise energy efficiency.

The building is expected to achieve its targeted NABERS ratings in the near future.

"Over the 11-month period from April 2018 to February 2019, the building was proven to operate well in excess of a 5.5 Star NABERS Energy – even bordering on the edge of 6 Star NABERS Energy performance," Kobler says.

> The building was proven to operate well in excess of a 5.5 Star NABERS Energy

And in achieving its 6 Star Green Star – Office Design v3 rating objective, 105 Phillip Street has also been heralded as Australia's 2000th Green Star certified project.

It is a fitting achievement for a project that represents the positive changes occurring across Australia's commercial office building landscape.

PROJECT AT A GLANCE

The Personnel

- Architect: **Bates Smart**
- Builder: **Built**
- Client: **Charter Hall** and **Dexus**
- Independent commissioning agent: **ECS**
- Mechanical services contractor: **Equilibrium Air**
- Mechanical services engineer: **NDY**
- Structural engineer: **Enstruct**
- Sustainability (ESD) engineer: **Wood & Grieve Engineers**

(Source: Built and WGE)