Following three and a half years of construction, the formerly isolated site for SEGA World at the southern end of Darling Harbour has been revitalised into a vibrant, mixed-use precinct that finally reconnects the area to Sydney’s CBD.

A collaboration between Lend Lease and the Sydney Harbour Foreshore Authority (SHFA), Darling Quarter features a family-orientated leisure precinct that boasts restaurants, a 4000 sq m playground, community green, youth theatre, 600-bay public car park and new pedestrian "street".

The development has been described as a "mediator" between the scale and intensity of the CBD and the open promenades and parklands of Darling Harbour, and features precinct-wide sustainable initiatives, with an emphasis on long-term social sustainability and place making.

Anchoring the precinct is Commonwealth Bank Place, comprising two eight-storey A-grade commercial office buildings with a combined net lettable area of approximately 57,000 sq m. This includes 3,000 sq m of ground-floor retail space and a 1000 sq m children’s theatre in the north building.

They are reported to be among the highest rated buildings of their scale by the GBCA; they were the first to achieve a 6 star Green Star Office As Built v3 rating, following certification of 6 star Green Star Office Design v2.

The Commonwealth Bank entered a long-term lease early in the design, and sought to centralise more than 6,200 staff who had previously been accommodated in 13 buildings across the Sydney CBD.

The move forms the final piece of the group’s Sydney metropolitan property strategy that set out to create three state-of-the-art workplace precincts at Parramatta, Sydney Olympic Park and in the Sydney CBD.

Particular attention was paid to the design of the blind system and return air path into the ceiling void to create the opportunity for heat trapped by the blinds to be vented away from the façade.

Continuing the popular trend of fit-out across Sydney, Commonwealth Bank Place has been designed to showcase activity-based working. Its innovative fit-out is expected to achieve a minimum 5 star Green Star Office Design v2 rating.
A BUILDING OF FIRSTS

According to architects FJMT (Francis-Jones Morehen Thorp), Commonwealth Bank Place represents a somewhat different type of approach to commercial office buildings than the norm.

“It is an architecture of human scale, natural minerals and of a warmth of character appropriate to this very public parkland location,” FJMT says.

The building envelope was designed to achieve important aesthetic, sustainability and occupant comfort criteria, maximising daylight and views while protecting occupants from glare as well as minimising heat gains and losses.

Glazing, shading devices and blinds were specifically designed according to each orientation.

As the concave western façade is the public face of the two buildings, and affords excellent views of the park and children’s playground, an innovative solution was required to realise the architect’s vision of full-height and clear glazing.

Charged with this task was Arup, appointed to provide mechanical services design, structural engineering and ESD design for the project. Arup also handled mechanical services design for the Commonwealth Bank fit-out on a separate commission.

The atria act as the extract air path by which exhaust air from the office floors rises to the roof, from where it is discharged to atmosphere through fans mounted in the roof plant rooms.

According to Australasia building services leader Andrew Pettifer, M.AIRAH, the design approach lay in the use of an internal timber blind that overcame the issues of excessive glare and thermal discomfort typical of near-clear glazing on west-facing glass.

“The west-facing façade addresses the Darling Harbour precinct across Tumbalong Park and the newly created children’s park,” he says. “As such, it provides an opportunity for occupants to feel connected to the precinct and enjoy these views – hence why the architect was keen to see full-height glazing on this façade.”

Arup undertook detailed analysis of a range of blind options before settling on full-height, automatic venetian-style blinds.

“Particular attention was paid to the design of the blind system and return air path into the ceiling void to create the opportunity for heat trapped by the blinds to be vented away from the façade,” Pettifer says.

The glass that was selected combines a 70 per cent visual light transmittance (VLT) with a low solar-heat-gain co-efficient, thus improving thermal comfort. It also features a low external reflectance of 10 per cent, reducing potential glare to pedestrians below.

Full-height glazing takes advantage of stunning harbour views, but required some artful engineering.
It is considered to be one of the first successful uses of such clear glass on a west-facing façade in Sydney; the building is reported to be within the top 25 per cent of the market in terms of daylight quality.

Additionally, the western façade’s design has allowed Lend Lease to create one of the world’s largest interactive digital facades, with LEDs located in each window bay enabling the entire façade to read as an interactive digital canvas at night.

INSIDE THE PLACE

Internally, the two Commonwealth Bank Place buildings feature full-height atria. Steel roofs afford a view of the sky and uniformly distribute daylight throughout what has been described as a campus-style space.

Steel cantilevered stairs and lightweight bridges traverse the atria, connecting various levels of each building. Steel cantilevered pods, containing meeting rooms, protrude into the void.

A fundamental challenge with the building was the need to accommodate air-handling units, cooling towers and tenant supplementary plant in the spaces available within the architectural roof form.

According to Arup, the atrium’s design met the architectural intent of creating clear floating structures, while satisfying the tenant’s requirement for a sense of interconnectivity and openness.
As each atrium has been designed to accommodate large numbers of staff for group meetings and functions, dedicated supply air systems serve the base of each atrium. The remainder of the atria heights are conditioned by spill air from the offices.

“The atria act as the extract air path by which exhaust air from the office floors rises to the roof, from where it is discharged to atmosphere through fans mounted in the roof plant rooms,” Pettifer says.

These fans also double as smoke-extract fans in fire mode.

The office floors extend to six floors on one side of each atrium, and nine on the other, to create a large void encapsulated by the west-facing sloping profile of the architectural roof.

Pettifer says this presented two concerns. The first was that heat gained in the atrium would cause a warm plume of air that would leak into the upper floors and impose an unwanted heat gain to the space.

The second concern was that upper floors would experience direct solar heat gain from the westerly sun coming across the atrium.

“Detailed CFD and thermal analysis of the atrium was carried out to assess these issues,” Pettifer says. “As a result, the geometry and location of the exhaust extract points were modified, and large operable blinds introduced to address solar gain into the glazed sections of the west-facing roof.”

The overall size of the footplate and limited slab-to-slab height also challenged the mechanical services design, and dictated very detailed coordination to determine how the HVAC and others services would fit.

Darling Quarter’s family-oriented precinct is home to a 4000 sq m playground and community green.
"A fundamental challenge with the building was the need to accommodate air-handling units, cooling towers and tenant supplementary plant in the spaces available within the architectural roof form," says Pettifer.

The solution creates a dramatic roof profile that reads as an architectural element rather than a rooftop plant room.

Though a 5 star NABERS Energy rating was the agreed target, the HVAC design – incorporating radiant passive chilled beams and 100 per cent outside air – was modelled at approximately 5 stars plus 40 per cent. In its first year of performance the building has been demonstrated to perform very close to this figure.

Radiant passive chilled beams with full outdoor air were selected for their ability to create an excellent internal environment while achieving best-practice energy performance.

Mixed-mode ventilation is incompatible with radiant passive chilled beams, due to the need to control humidity levels and prevent condensation on the beams. The HVAC design therefore took its cue from the activity-based working environment of the fit-out, and introduced natural ventilation in selected areas.

"In order to provide the opportunity for staff to experience a naturally ventilated environment, when conditions are favourable a number of mixed-mode rooms were provided, which are isolated from the main open-plan areas," says Pettifer.

"This approach is consistent with the philosophy of activity-based working, in that it offers occupants a further alternative type of space."

**ACTIVITY-BASED WORKING**

The Commonwealth Bank signed on as sole tenant early in the design process. Still, even after the overall concept for the development had been conceived, the requirement for an activity-based working fit-out didn’t play a determining role in the base building design.

This was despite the fact Commonwealth Bank Place has been reported as being the largest activity-based working project in the world.

The building required a fit-out design that responds to the varying requirements of different types of spaces that make up a true activity-based working environment.

“Particular attention needed to be paid to the thermal, aural and lighting design in each part of the building,” Pettifer says, “rather than the traditional approach to an open-plan office, which is generally about providing a consistent internal environment throughout.”

At Commonwealth Bank Place, the design is such that teams are assigned a primary working space called a “home zone”. Personal lockers are provided for storage, and these spaces are dotted with stylish open break-out rooms, collaboration spaces and designated meeting areas.

In addition to wireless technology being used across both buildings, a paperless office has also been created.

Although one of the strong selling points of activity-based working is that it empowers staff to engage with their working environment, there remains some cynicism around the concept.

Responding to those who see it as a cost-cutting exercise, or who believe it leads to noisy, cramped and sterile working environments, Pettifer says such criticism is ill-informed nonsense.

He says such views may be based on “hot desking” being incorrectly labelled as activity-based working.

“The whole philosophy is to create a range of types of spaces and environments that can be used to meet the particular needs of occupants at any one time,” he says. “When activity-based working is implemented correctly, as in this case, it creates an extremely rich and flexible working environment.”

**BEYOND THE FIT-OUT**

Commonwealth Bank Place features a number of sustainability initiatives, including a trigeneration system and recycled water plant.

As the project was designed before the City of Sydney developed its Green Transformers strategy, the trigeneration plant was always conceived to act in island mode.

Early examples of trigeneration plant in commercial buildings infamously experienced issues with over-sizing. Arup therefore completed very detailed load-profiling and energy modelling of both electrical and thermal systems to ensure the plant in this instance was correctly sized.

The resulting system comprises of two 400kWe natural gas generators, with an absorption chiller capable of providing 500kWr of cooling in the form of chilled water.

The trigeneration system is integrated into the building’s BMCS and EWMS (energy and water management system), providing the ability to monitor power consumption of the base building while controlling generator output to maximise efficiency.

Two 1650kVA emergency generators were also installed for redundancy.

As a means of future-proofing the development against rising water costs, an on-site recycled water system
The Lessons Learned

Andrew Pettifer, M.AIRAH, reflects on the Commonwealth Bank project.

1. Attention to detail in design pays dividends in terms of occupant satisfaction on occupation.
2. Detailed energy modelling is essential to ensure that plant is correctly selected to achieve the targeted energy performance.
3. This is turn allows trigeneration plant size to be optimised.
4. Fine-tuning and energy monitoring by the design team helps ensure the building operates as designed, and provides a valuable feedback loop for the designers.
5. The importance of a collaborative and joined-up approach between the developer, architect, designers and constructors.

(including blackwater treatment) has been designed to treat around 245kL of collected rainwater and sewage each day.

The system was designed around the collection of approximately 2.8GL of rainwater from the buildings’ roof area annually, which is filtered, UV treated and distributed to the public domain for landscape irrigation and make-up water for the civic connector water feature.

The plant also uses sewer mining to treat sewage collected from a nearby Sydney Water sewer.

Combining leading-edge biological and membrane processes, the system features a “moving bed bio-reactor” (MBBR) to produce 166kL of very-high-quality treated water. This is used across the buildings for toilet and urinal flushing, garden irrigation and as cooling tower make-up water.

These systems contribute to a 92 per cent potable water use reduction, equivalent to 86 million bottles of water annually.

Naturally, both systems have contributed significantly to the project’s 6 star Green Star achievements. To this end, Lend Lease took a lead role in the Green Star documentation and submission process, while Arup completed the detailed analysis required to support the submissions.

According to Pettifer, this strategy worked well, and helped realise the 6 star Green Star outcomes in Office Design and AsBuilt without any significant problems.

"Lend Lease’s approach is very ‘hands on’, which means that they bring their considerable experience to bear in the design process and work closely with the consultant team to ensure that the desired outcome is achieved,” he says.

Pettifer says the project also gained significantly from Lend Lease’s experiences in the construction of other leading sustainability projects such as 30 The Bond.

It has resulted in Commonwealth Bank Place becoming the next generation of sustainable, premium grade office in the Sydney market, and has set a new benchmark for those to follow. ||