

PARKROYAL on Pickering A NEW GENERATION OF TROPICAL HOSPITALITY

Text by urchin
Photography by Patrick Bingham-Hall / courtesy of WOHA Architects Pte Ltd
Drawings by WOHA Architects Pte Ltd

PROJECT CREDITS

Location: 3 Upper Pickering St **Completion Date:** June 2012 **Client / Developer:** Pan Pacific Hotels Group Limited **Architect:** WOHA Architects Pte Ltd **M&E Engineer:** Beca Carter Hollings & Ferner (S.E.Asia) Pte Ltd **Structural Engineer:** TEP Consultants Pte Ltd **Quantity Surveyor:** Rider Levett Bucknall LLP **Main Contractor:** Tiong Seng Contractors (Pte) Ltd **Landscape Consultant:** Tierra Design Pte Ltd **Façade Consultant:** Meinhardt Façade Technology (S) Pte Ltd **Lighting Consultant:** Lighting Planners Associates (S) Pte Ltd **Acoustic Consultant:** CCW Associates Pte Ltd **ESD Consultant:** LJ Energy Pte Ltd **GFA:** 22,227 m² **Plot Area:** 6,959 m²

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PARKROYAL on Pickering, developed by Pan Pacific Hotels Group Limited and designed by WOHA Architects, is a new generation of sustainable luxury hotels that was built with an office block that is occupied by the Attorney-General's Chambers. Its striking façade exposes an array of sky gardens, green walls, and planter terraces, an expression of organic life within Singapore's dense Central Business District.

Conceived as a "hotel in a garden", the hotel marks a first in the developer's portfolio of 13 hotels, serviced apartments, and resorts across Asia Pacific with a clear display of its commitment to sustainability and a progression in WOHA's tropical architecture with an unprecedentedly organic approach. Among its numerous green features are rainwater harvesting, solar power, a network of sensors to regulate water and energy expenditure, and highly efficient heating and cooling systems. These features have garnered recognition and accolades, such as BCA Green Mark's highest Platinum certification, by the Building and Construction Authority (BCA), and the Solar Pioneer Award, by the Energy Innovation Programme Office that is led by the Singapore Economic Development Board and Energy Market Authority.

The 16-storey skyscraper features over 15,000 square metres of greenery, which amounts to twice its land area and a Green Plot Ratio (defined by BCA by "considering the 3D volume covered by plants using the prescribed Leaf Area Index") of 12 points or over 200 percent.^{1,2} An architectural and visitor highlight are the numerous four-storey-high sky gardens, which are admirably Singapore's first zero-energy sky terraces. They are completely powered by the 60-kilowatt-peak photovoltaic cells on the roof, which not only power the softscape's lighting and UV lamps but also effectively reduce the building's total energy consumption by one percent. The carefully curated, low-maintenance flora proliferates all areas of the building and is not only aesthetically relevant but also functionally contextual to different settings, such as mitigating thermal gain on the west-facing wall and improving air quality in indoor areas.

Considering the long hours spent in closed air-conditioned environments by inhabitants of dense and heavily built-up cities like Singapore, the attempt to incorporate biodiverse plant species and open

spaces into non-residential buildings on a comprehensive scale is an important means of improving occupant well-being with epidemiological advantages and health benefits. Furthermore, the proliferation of flora also encourages biodiversity by extending the natural landscape for wildlife whose natural habitats are otherwise encroached upon by urban spaces.

Besides the teeming greenery that is visible at various scales, the hotel's functional design seeks to outperform conventional building standards. Throughout the building, double-glazed low-emissivity glass is extensively employed to maximise the penetration of sunlight into the building while limiting solar heat gain. West-facing walls are shaded by carefully selected vertical greenery to prevent thermal gain or reflection into guest-rooms. The resulting Envelope Thermal Transfer Value of the property is 39.49 watts per square metre, which is a 20 percent improvement over the regulatory requirement of 50 watts per square metre.

Top-down efforts have emphasised embodied energy concepts as a means to reduce overall environmental impacts. In line with schemes such as BCA's Concrete Usage Index, Cobiax void formers were used to accomplish PARKROYAL's structurally complex design, which displaced 440 cubic metres of concrete volume and saved 760 cubic metres of concrete that would otherwise have been needed for beams in conventional construction techniques. According to the Cobiax-specific ratio of 210 kilograms of carbon dioxide per cubic metre, 250 tons of carbon dioxide were saved and 200 concrete truck trips averted by the reduction in concrete used.³

The hotel's hot water system consists of air-to-water heat pumps that have a Coefficient of Performance exceeding 4.0, resulting in 60 percent less energy consumption for the production of hot water versus regular heating systems. Additionally, the cold air resulting from the heat exchange is recycled for use in air conditioning. Both the hotel and offices share a centralised chiller system featuring variable speed pumps and high-efficiency cooling towers that dynamically modulate their capacity in response to unpredictable cooling loads that rapidly vary with the weather and occupancy—this enables an efficiency of better than 0.63 kilowatts per refrigeration ton.





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1. Conceived as a “hotel in a garden”, PARKROYAL on Pickering is Pan Pacific Hotels Group’s newest development in the Central Business District.

2. Designed by WOHA Architects, the hotel’s organic design reveals various tiers of greenery, plain to see at the street level.

3. As seen from across the urban park, PARKROYAL’s distinctive profile features curvilinear forms and extensive greenery.

4. Infinity-edged pool and cabanas receive good views on the fifth-floor sky terrace.

5. Views from the street expose the podium carpark on the third and fourth floors, cascading waterfall from the infinity-edge pool, and cabanas perched by its edge.

6. The open urban verandah and covered walkway contribute to the permeability and breathability at the ground level.



7. Great views from the fifth floor of the underside of the sculpted sky terraces above and of the surroundings.



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 Elevation

An array of chemical, light, and water sensors further enables the hotel to make demand-based and environmentally aware resource optimisations that minimise energy use. Carbon monoxide and carbon dioxide sensors regulate the car park's mechanical fans and the ventilation systems of interior spaces. A reduction of more than 20 percent above the industry standard in Lighting Power Density was achieved through the use of LED lighting and T5 fluorescent lamps, which work in concert with the emphasis on natural lighting and effectively harness reflective surfaces and deep overhangs to generate a warm intimate atmosphere. Furthermore, the hotel's short building depth, open areas, generous windows, mirrors, and reflecting pools maximise the penetration of sunlight. More than 50 percent of the hotel's guest rooms are found on open-air walkways while all of the office lobbies and common toilets also similarly eschew the need for constant air conditioning, ventilation, and unnecessary lighting.

The building's water management similarly leverages on the environmental context to avoid wasteful consumption. Non-potable NEWater is used for the cooling system and water features while the gravity-fed drip irrigation system uses rain water instead when rain sensors have detected a sufficient amount of rainfall. Coupled with an advanced leak detection system and high-quality water fittings, annual savings in water consumption is calculated to be around 6,900 cubic metres.

These measures have achieved profound impacts. The estimated annual energy savings of PARKROYAL on Pickering's green features are a significant 3,117,212 kilowatt-hours, while energy simulations have projected the property to perform at an energy-efficiency more than 31 percent better than without its numerous energy-saving measures.

Going through the list of PARKROYAL on Pickering's impressive green features, the profound impact of Green Mark's certification guidelines on the planning, design, and management of the building is unmistakable. Yet, they remain the minimum benchmark for sensible developments to improve on. While little fault may be found with many

of the building management policies and design regulations that encourage sustainable construction and operation, perhaps future metrics could be extended to address the integration of a structure with its surrounding environments so as to avoid the phenomena of skyscrapers as isolated mini-cities, green as they may be.

For example, low-emissivity glass, especially if double-glazed, has the potential to undesirably reflect and concentrate heat on surrounding surfaces, while on the other hand, open greenery reduces water runoff and encourages biodiversity for the building and its neighbours. Further, the obstruction of airflow and traffic, among other environmental disruptions, by built structures can be challenged by encouraging more open designs and truly public rather than insular common areas. Deeply integrating the circulation of buildings organically with the patterns of the wider city has the added advantage of cultural sustainability, which translates to commercial resilience.

Ultimately, PARKROYAL on Pickering is an encouraging example of the development of contextual sustainability initiatives like Green Mark and advancing technical expertise by dedicated architects, which signals the nascence of a truly sustainable, tropical, bioclimatic architectural vernacular that is crucial to improving the liveability of the city. 

¹ Building and Construction Authority, 2010, *The BCA Green Mark Certification Standard for New Buildings (GM Version 4.0)* (Singapore: Building and Construction Authority), accessed March 28, 2013, http://www.bca.gov.sg/Envvsuslegislation/others/GM_Certification_Std2010.pdf, 29.

² Building and Construction Authority, 2012, "BCA Awards 2012," accessed March 29, 2013, <http://www.bca.gov.sg/greenmark/others/gm2012.pdf>, 39.

³ Cobiax Technologies (Asia) Pte Ltd, "Project Factsheet: Mixed Use Complex - 'Park Royal' Hotel and Offices at Upper Pickering Street, Singapore," accessed March 24, 2013, http://www.cobiax.ch/downloads/news/english/Project_Factsheet_UPS_1109.pdf.