
Leadership in Sustainable Design and Performance - Residential

TREE HOUSE

AN ICONIC GREEN RESIDENCE,
INSPIRED BY NATURE





Nestled within the Upper Bukit Timah and Chestnut Avenue private residential enclave, Tree House condominium has caught the imagination of many with its eye-catching facade. Its stunning 24-storey 2,289 square metres (sqm) vertical garden is hard to miss – in April 2014, it entered the Guinness World Records for largest vertical garden, placing Singapore’s built industry in the global spotlight.

Developed by leading eco-developer City Developments Limited (CDL), the 429-unit eco-residence was completed in 2013. Within its verdant grounds are four blocks of 24-storey apartments, along with an environmental landscape deck, common basement car parks, and a myriad of recreational facilities including a plunge pool, floating hammocks, tennis courts and a jogging track.

Reflecting CDL’s ethos to “Conserve as it Constructs”, Tree House showcased the hallmarks of CDL’s eco residences – it was designed sensitively, built sustainably and managed sensibly. From the outset,

around 2.7 percent of the development’s total construction cost was invested in green design and innovation. Altogether, its sustainable design features are expected to result in energy savings of over 2,400,000 kWh per year and water savings of 30,000 cubic metres per year, or approximately a total of over S\$500,000 per year.

NATURE’S INSPIRATIONS

Surrounded by nature and greenery that is largely a green oasis encompassing a forested area, nature reserve, park connector and parks, Tree House drew its design inspiration from its natural surroundings – otherwise known as Biomimicry, or innovation inspired by nature.

By observing nature’s models, the architects of Tree House took inspiration from these designs and processes to solve human problems. For instance, a solar cell inspired by a leaf, or a bio-shelter inspired by plant structure for the cooling of living environment; the conceptualisation of the Green Wall was inspired by the nearby Zhenghua Park.

SUSTAINABLE GREEN WALL

Magnificent and majestic, the green wall is approximately 78 metres tall and 20 metres wide.

GREEN FACTS AND FIGURES

- 1 Vertical garden measures 78 m high and 20 m wide
- 2 Total square area of 2,289 sqm
- 3 Giving structure to the vertical garden is a modular steel frame that took a year to fabricate and install
- 4 Planted with lush *Thunbergia grandiflora* vines, which took 14 months to plant and grow
- 5 Platforms and cat ladders were installed behind the vertical garden to facilitate maintenance. From these platforms, the planter boxes of the creepers can be easily accessed, enabling ease of maintainance
- 6 Approximately 2.7 percent of Tree House's total construction cost was invested into the development of its green innovations



More than just a unique architectural structure, the green wall, or vertical garden, was designed with environmental sustainability in mind. A natural insulation, it reduces the estate's carbon footprint by filtering pollutants and carbon dioxide out of the air.

In continuity of greenery from adjacent green surroundings, the green wall also functions as a Bio-shield against the westerly sun, reduces solar radiation and heat absorption, and lowers the energy needed to cool indoor spaces.

This is expected to achieve air-conditioning energy savings of between 15 percent and 30 percent, or a total of approximately between S\$12,000 and S\$24,000 annually for the 48 west-facing master

bedrooms that are insulated by the vertical wall.

To complete the nature-inspired architecture, there are three layers of green sky gardens on the seventh, 13th and 19th floors of each block in Tree House, with green creepers clinched on the circular support. These act as vantage points and additional vertical green lungs for residents. The extensive cantilever of sky gardens maximises greenery and provides shade for internal spaces in Tree House.

PLANNING AROUND BIODIVERSITY

The site planning embraces the native ecosystem by studying existing biodiversity and climatic conditions.



Spanning across an expansive site area of 22,700.40 sqm and gross floor area of 52,437.92 sqm, the development offers a myriad of recreational facilities including a plunge pool, floating hammocks, tennis courts and a jogging track.

A Biodiversity Impact Assessment was carried out to ensure continuity of the original ecosystem, and that vertical greenery and generous landscaping is expressed throughout the development.

Native plants and fruit trees were planted within development, along with the provision of the Eco-Pond and “bio-swales” in respect to the biodiversity study. Some 99 native animal and 32 plant species were identified, which was followed by a careful selection of tree and plant species for landscaping to attract native wildlife, among a long list of other recommendations to protect biodiversity.

Taking advantage of the natural sloped terrain of the site, the “bio-swales” aid in the collection of rainwater for landscape irrigation purposes, where the collected rainwater can then be treated and filtered, to be reused.

The “bio-swales” detain and treat rain water run-off from about 10 percent of the paved areas. Implementation of the swales is a sustainable green practice that not only provides an additional green aesthetic element, but also performs a vital role in reducing pollution to waterways. They filter pollutants, reducing the infiltration of pollution in groundwater. The swales are environmentally viable alternatives to conventional storm drains that are used to convey storm water run-off.

SUSTAINABLE DESIGN & CONSTRUCTION

During block planning, the towers of Tree House were set in a north-south orientation to capitalise on passive environmental design. Concurrently, typical lobbies and basement car parks were designed to be naturally ventilated to eliminate the use of mechanical ventilation, smoke purging and sprinkler systems. Such deliberation has achieved significant impact to the natural lighting brought into the basement and has also cut down the need for mechanical ventilation, thereby allowing residents to enjoy the benefits of good natural lighting and ventilation.

As part of the careful consideration during design and construction, sustainable materials were used in the building process. These materials include laminate wood flooring, waterproofing, and composite timber flooring.

To employ building technology that is both efficient and sensitive to the environment, Tree House’s construction was also largely driven by pre-fabricated construction methods.

Aside from extensive use of precast concrete for columns, walls, beams and slabs, Prefabricated Bathroom Units (PBUs) were installed in 75 percent of all toilets. By manufacturing and assembling the PBUs



At the heart of Tree House are the majestic, eponymous Chestnut Tree Houses that will surely impress at first sight.



Within the sturdy boughs, children can spend hours playing their fairytale fantasies in their own perfect world.



Linking the tree houses is the Tree Top Walk, the ideal place for a romantic stroll in the evening. With ethereal lights illuminating the path, the tree houses come to life at night as the soft glow through the arches creates a mystical tapestry of silhouettes.

off-site in factories and later delivering them to the construction site for installation, this increases social and environmental benefits, as a safe and healthier working environment is created through reduced site work.

In addition, service pipes were concealed in PBUs for greater reliability, performance and aesthetics. Produced locally, these high quality modules contributed to savings in manpower and time on-site and reduced heat transmission on-site during the construction stage.

A Cobiax flooring system was also used in the development. A void-forming technology which forms light-weight, biaxial floor slabs, it reduces the volume of concrete by displacing non-working deadload and reduces the cost of the foundations.

To maximise energy savings, other green features at Tree House include the use of heat-reducing laminated green tinted windows, lifts with Variable Voltage and Variable Frequency motor drive and sleep mode programming and motion sensors at staircases that will activate lights automatically.

INSPIRING GREEN LIVING

Within the apartment units, green design also took centre stage. Residents enjoyed numerous eco-conscious design features within their living spaces.

Apartments are fitted with energy-efficient inverter air-conditioning and gas heaters, as well as water efficient sanitary fixtures and fittings. The use of water sub-meters helps to monitor water usage in key common areas, and reduce water usage.

For good indoor environmental quality and environmental protection, low formaldehyde adhesive was used for woodworks, while low VOC paints were used for internal walls and ceilings which improves air quality.

To encourage residents to recycle, a dual-chute pneumatic waste collection system allowed the segregation of domestic and recyclable waste. ✔

Architect: ADDP Architects LLP

Project Interior Design: Axis ID Pte Ltd

Landscape Consultant: COEN Design International Pte Ltd

M&E Engineer: United Project Consultants Pte Ltd

C&S Engineer: DE Consultants (S) Pte Ltd

Quantity Surveyor: Davis Langdon & Seah Singapore Pte Ltd

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