

**Skyrise
Greenery
Showcase
1st Edition**

Introduction

Encompassing rooftop and vertical greenery, skyrise greenery is one of the most impactful developmental approach in restoring nature in the built environment. This multi-layered greening strategy can bring about tremendous benefits. Besides improving the distinctiveness of architectural design and aesthetics of a building, greenery in buildings also plays a pivotal role in mitigating urban heat island effect, strengthening Singapore's efforts in creating a climate resilience-built environment.

Like other forms of green spaces, roof gardens and vertical greenery naturally creates habitats for flora and fauna. This increased presence of biodiversity is then linked with positive effects associated with connecting people with nature, improving well-being and raising the quality of the living and working environment.

As Singapore now progresses into becoming a City in Nature at the backdrop of a more complex and challenging world, a more concerted effort is needed from policymakers, developers, building owners and professionals to redefine the work that has been done in the past decade in the development of skyrise greenery spaces. Guided by principals of biophilic design, the way forward is to collectively create spaces that are more naturalistic, more sustainable in both design and maintenance and to ensure a constant balance between ecology and the built environment.

We hope that these showcase projects will help immensely in inspiring you for your future projects. If you are a landscape designer and wish to be featured in next year's edition, do send us an email at Skyrise_Greenery@NParks.gov.sg.



Featured Projects

Note: Projects featured in this newsletter are contribution pieces by landscape designers. NParks does not endorse, recommend nor guarantee the quality of product or services offered.

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Village Hotel Sentosa

COEN Design

10 Artillery Avenue, Sentosa Island, 099951

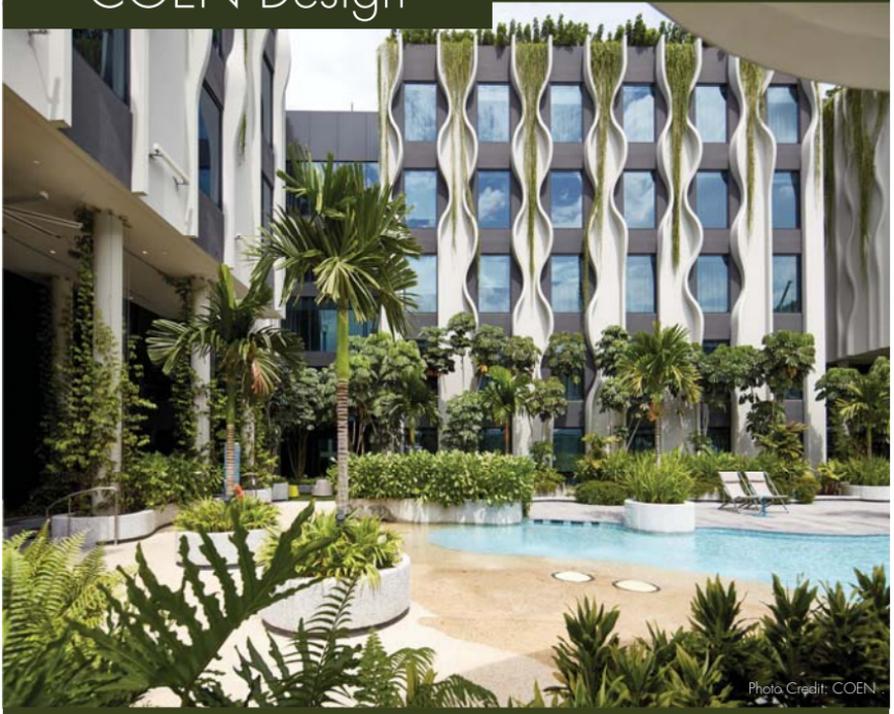


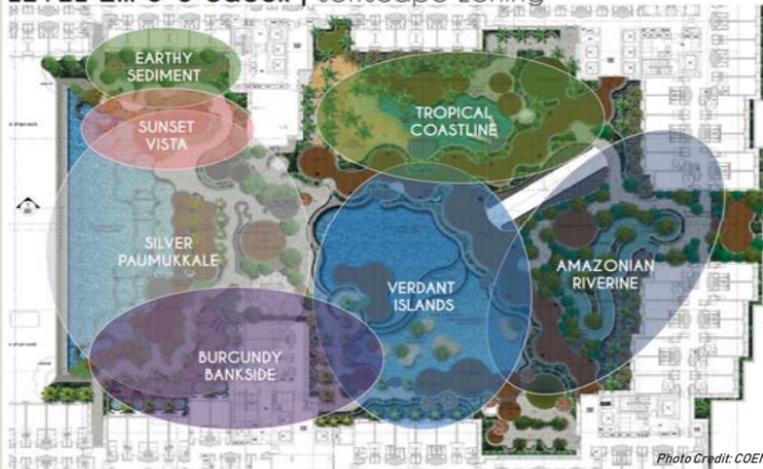
Photo Credit: COEN

Designers' Commentary:

We strived to conserve existing mature trees in this hotel development as we view these beautiful mature sculptural canopies as earmarked beacons of biodiversity lineage that adds to the building of Singapore's ecological resilience. Some examples of trees that we managed to conserve include native tree species of *Ficus religiosa*, *Syzygium grande*, *Tamarindus indica*, *Pterocarpus indicus*, *Saraca cauliflora* and *Pandanus tectorius*.

In view of existing ecological network within Sentosa Island, we added new tree and shrub species in order to ensure biodiversity continuation at the delineated softscape areas around the hotel. These active ecological efforts act as integral stepping stones for the movement of flora and fauna within Sentosa island, while maximizing conservation of natural heritage.

LEVEL 2m & 3 edeck | softscape zoning



Thematic gardens, each with a carefully curated planting scheme, were designed to create a relaxing natural environment and accentuate architectural facades.



Multi-layered planting technique promotes shade to otherwise harsh building surfaces and enhances visual interest

EDEN Residences

COEN Design

2 Draycott Park, Singapore 259386

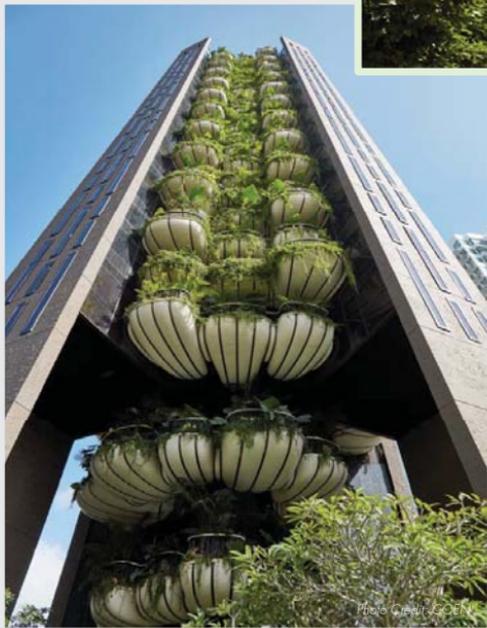


Designers' Commentary:

The design of EDEN draws inspiration from Singapore's motto 'City in Nature', where tropical living is redefined with specially curated flora displays optimally planted at every level to take advantage of natural light.

We innovatively created vertical greenery with use of balcony pods lushly filled with emerald foliage and horticultural treasures, such as *Alocasia macrorrhiza* 'stingray', *Musa lasiocarpa*, *Etilingera elatior*, *Heliconia rostrata* and *Philodendron selloum*. Our unique green installation aims to cool the building down and improve energy efficiency with these gorgeous greens.

The balconies are specially designed with the concept of a biophilic horticultural experience. Projecting from all the apartment balconies are flora teeming with life, guiding the eye skywards. Plant choice is also crucial as curated shrubs species ease acclimatization and maintenance, creating a lasting, refreshing and varied foliage.



The balconies further cascade with the foliage of *Phyllanthus cochinchinensis*, accompanied by *Veronica elliptica* climbing over the rims at different intervals to create an exuberant waterfall of vertical green foliage.

Green Roof Mobile Bus

GWS Living Art



Photo Credit: GWS Living Art

Designers' Commentary:

We created Asia's first bus with green roofs in an effort to study the effects of green roofs on moving vehicles. This innovative endeavour took 2 years to design, prototype and test on 10 trial buses, with close collaboration with stakeholders to bring the concept to fruition. For this initiative, we have also worked with NUS on a meaningful study on whether green roofs can effectively reduce heat transmissions in public buses. We are grateful for this opportunity to raise awareness about the benefits and beauty of urban greenery.

Changi Jewel Green Walls

GWS Living Art

78 Airport Boulevard, Singapore 819666



Photo Credit: GWS Living Art



Photo Credit: GWS Living Art



Photo Credit: GWS Living Art

Designers' Commentary:

The newest addition to Changi Airport, Jewel, is a lush green place that elevates Singapore's title of 'City in Nature' further. Our proprietary GWS Green Module System allows for elaborate green walls, creating a luscious 800 sqm green wall using different colours and texture variations from their plant palette. The wall is installed with growth lights and automated irrigation system for sustainable growth. This project is a wonderful example of how indoor green walls help to provide alluring, inviting and soothing environment to visitors.

Temasek Shophouse

Greenology

28 Orchard Road, Singapore 238832



Designers' Commentary:

Being a heritage building, Temasek Shophouse's roof loading was less than ideal for a rooftop garden to be installed with potential limitation in soil depth that could hamper plant selection and planting density. We are proud to overcome the site limitations by working with engineers to strengthen the roof and create a gorgeous, lushly planted Roof Garden on the 4th floor. This project classically exemplifies how gorgeous rooftop gardens can be made possible on existing developments which was not constructed with sufficient loading capacity for a rooftop garden.



Photo Credit: Greenology

With the use of a roof garden tray system and integrated raised planters, we have created a luscious roof garden that allows taller trees to be planted with the "extra" soil depth without causing any loading issues. On top of that, the soil mix was a special mix developed by Greenology.



Photo Credit: Greenology

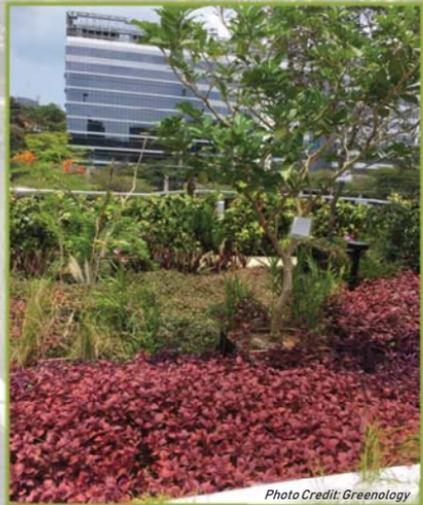


Photo Credit: Greenology

Our planting palette consists of a diverse vegetation of biodiversity attracting grasses, ground-covers, shrubs and trees that brought bees, butterflies and birds onto the rooftop sanctuary alongside bustling Orchard Road. We have managed to bring in 36 species of plants in a tight space of 130 sqm.

A low stand-alone Greenwall system was later included to soften the white perimeter parapet wall, giving a more complete immersive experience of the special green space on the 4th floor of a heritage building.

Green Wall at Park Royal Marina Bay Hotel Reception

6 Raffles Boulevard, Singapore 039594

Greenology



Photo Credit: Greenology

Designers' Commentary:

The Park Royal Collection Marina Bay is an eye-opening transformation of Marina Mandarin hotel into a "garden-in-a-hotel" concept where diverse greenery is used to create an urban Jungle sanctuary in the CBD. We were challenged to recreate a modern and artistic concept of a cliff face as a backwall-centrepiece and we successfully created this 18m tall creation in record time of 1 month with the hotel still in operations. The plants help to act as a natural air-filtration system as guests are greeted by green lush foliage. The wall also help to reduce ambient noises emitting from bustling traffic around the hotel.



Photo Credit: Greenology



Photo Credit: Greenology



Photo Credit: Greenology

We developed and devised innovative ways to ensure the sustainability of an interesting mix of plants, through the use of our customised Greenology Vertical Greenery system, integrated irrigation and fertigation system.

To add to the challenge, we artistically created moss-scapes with a cloud formation infused at the top of the green wall. The fins installed on the green wall are designed to mimic rendition of the craggy face of a cliff.

Jewel Changi Sky Terraces

78 Airport Boulevard, Singapore 819666

ICN Design



Photo Credit: ICN

Designers' Commentary:

We are honoured to be involved in the design, sourcing, construction and set-up of the award-winning iconic Jewel, where magnificent landscapes are showcased in world-class setting. It is crucial for us to conduct plant trials to ensure survival of proposed selection due to the completely man-made environment in Jewel with temperatures reaching an average of 23 degrees and humidity of 60-65%. We had to constantly monitor the growth of plants and their success for 2 years before the first palms were installed on site late at night and into the wee hours of morning. The challenges that we faced and successfully overcame made this an amazing, memorable experience for us.

Centred at world-renowned Changi Airport, Jewel is an award-winning epitome of fine architecture being seamlessly integrated with remarkable forest-like green landscape installed on its enormous roof garden and numerous tiered sky balconies.



Photo Credit: ICN

At each tier balconies, there are cascading plants creating dramatic views and a comfortable conducive environment for the plants. Each tropical plant species were tested for performance and adaptability, with more than 3,000 trees, palms and plants acclimatised to achieve this impressive environment.

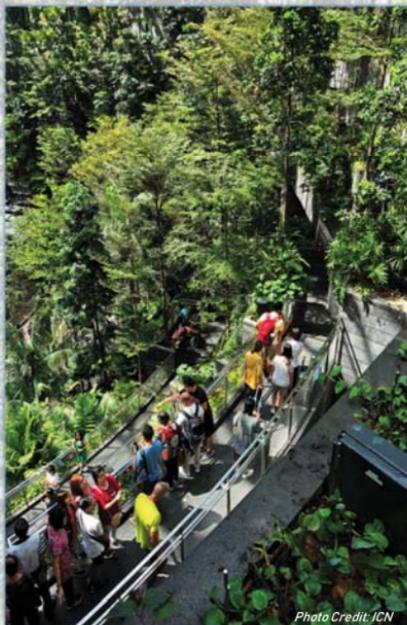


Photo Credit: ICN



Photo Credit: ICN

The great caldera that occupies the interior space was transformed into a "Forest Valley" complete with canyons 5 stories high, waterfalls, forest trails, bridges, restaurant frontages and, links to the outer airport connections.

Jewel is an excellent example of how well-executed green installation holds inherent ability to draw people towards it to enjoy the beauty of installation

Alkaff Courtview & Lakeview

Nature Landscapes

251 Upper Serangoon Road, Singapore 347688



Photo Credit: Nature Landscapes

Designers' Commentary:

One of the most sought-after Build-to-Order (BTO) flats due to its location are the Alkaff Courtview and Alkaff Lakeview. The new estate, built atop what was once Singapore's largest cemetery, will have homes amidst lush greenery with the vision of being a "community in a garden" while retaining its heritage.

We are happy to be given this opportunity to green up public residential places with beautiful rooftop gardens, providing a more liveable relaxing living environment for people.

Running through the whole of the estate is the tree-lined “greenway”, which provides an uninterrupted route for pedestrians and cyclists. Pathways link this immersive meandering route, shaded by hundreds of trees and plants that absorb heat.



Its green roofs slated above carparks feature robust species for low water usage and hardiness, regulating transpiration, shade and cool. These shared green spaces are carefully re-established as homage to its historical heritage while catering to new individuals and families that together make up this new community.



Park Mall Redevelopment

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Nature Landscapes

9 Penang Road, Singapore 238459



Designers' Commentary:

Located within the gateway of Singapore's prime shopping belt Orchard Rd, Civic District and CBD, this redevelopment of former Park Mall is strategically located near Fort Canning Tunnel and opposite bustling Dhoby Ghaut.

Featured prominently on its façade is the green wall, which is designed to soften the building's hardscape and yet not compromise on design of building. The green installation is also introduced in a bid to reduce the building's heat-emissions and energy-consumption.



Photo Credit: Nature Landscapes



Photo Credit: Nature Landscapes

We made careful considerations to the plant palette selected to ensure its hardiness, given that the plants will be located beside major roads with high traffic. The look and feel of plant choice must also gel well with the new green spaces linking from Penang Road to Fort Canning Park, along the streetscape.

Apart from the aesthetics of the green wall, we also made consideration to ease of maintenance and safety of maintenance contractors, such as use of boom lift and life-line harness.



Photo Credit: Nature Landscapes

Pathlight School

5 Ang Mo Kio Avenue 10, Singapore 569739

Prince's Landscape



Photo Credit: Prince Landscapes



Photo Credit: Prince Landscapes

Designers' Commentary:

We are proud to be one of the oldest nurseries in Singapore, continuing our legacy of contributing greenery to Singapore. The green roof MEP tray installed in Pathlight School is about 45sqm in area with a focus in being low maintenance and yet, effective in reducing the harshness of hardscape.

With our vast experience in planting and knowledge in the practical implementation of our gardens, we detailedly planned out and executed the auto-irrigation system which consisted of an electric-operated irrigation control with 24V solenoid valve, 3.7 lit fertilizer tank with disc filter, 32mm HDPE irrigation sub main, 16mm LLDPE irrigation and 2L/H online emitter.

Park Place Residences

Prince's Landscape

2 Paya Lebar Road, Park Place Residences at PLQ,
Singapore 409033



Photo Credit: Prince Landscapes

Designers' Commentary:

Park Place Residences, located at 2,6 and 8 Paya Lebar Road, is a project comprising of 429 luxury apartments and holds a tenure of 99 years. This project is part of a larger mixed used commercial development, Paya Lebar Quarter.

We were engaged to complete their biggest green wall of the year 2019 with a total area of about 176 sqm, using VGP Planter installed on 50x 150 mm x 5mm hot dipped galvanized wire mesh. The green wall has its own auto-irrigation system to ease maintenance and certainly adds to the aesthetics of the property, inevitably raising the value of the project.

East Coast Upgrading

Uniseal

Raintree Cove, Goldkist and Big Splash



Photo Credit: Uniseal

Designers' Commentary:

East Coast Park is one of Singapore's most treasured urban getaways, providing a recreational arena for the busy daily life of residence. With the theme 'Recreation for All', the park has activities catered for everyone of different ages. East Coast Park had undergone a transformation to provide more open spaces and amenities which incorporated three key nodes, namely (1) Raintree Cove, (2) Goldkist and (3) Big Splash.

We are proud to be involved in the East Coast Park's improvement works by installing their sustainable green roof system which helps to alleviate rain water run-off while efficiently utilising the roof in an aesthetic manner. The green roof sheets we used are flexible and can be manipulated to adjust to the contour of deck.

Raintree Cove



Photo Credit: Uniseal



Photo Credit: Uniseal

Raintree Cove's pavilion roof was installed with PlanterCell® 30 green roof tray system. The system consists of lightweight and high strength water retention and drainage tray that can be applied both as a green roof system or a sub-soil drainage system. The sturdiness of the tray supports the weight of the water stored in its cells, planting mix, plants and human traffic. The tray interlocks together to form a sturdy platform for planting or drainage purposes.



Photo Credit: Uniseal

Big Splash



Photo Credit: Uniseal



Photo Credit: Uniseal

Big Splash's and **Goldkist's** roof was installed with PlanterCell® VegaMat lightweight hygroscopic green roof mat system. The system incorporates multifunctional water retention and filter layers to form a flexible vegetated composite blanket mat, ready for installation over existing or new roof structures without any secondary substrate growing medium. Organic soilless planting media is used in the pre-growing process. Mat can be easily cut to conform to any sizes and shapes of the roof structures.

Goldkist



Photo Credit: Uniseal



Photo Credit: Uniseal

Kent Vale, NUS

Uniseal

107 Clementi Road, Singapore 129790



Photo Credit: Uniseal

Designers' Commentary:

Kent Vale comprises 3 blocks of serviced apartments for staff, guests and visitors of NUS as well as conference participants. The building is a Green Mark Platinum rated project with vertical greenery on the facades. We are proud to be appointed to retrofit their sustainable PlanterCell® H2O-R green wall system to replace the existing vertical greenery system which has failed.

The green walls transient the horizontal landscape at ground level vertically up to the sky terraces and rooftop gardens to create a relaxing living environment, continuing to act as a green lung within the vicinity while reducing noise and dust pollution.



The design of the façade conglomerates the use of different materials to create a harmonious synergy that forms a bio-skin which hugs the building. The five elements in geomancy study were brought together in balance to reduce the bad vibes and enhance the good ones, i.e. wood (trees and shrubs), water (irrigation), fire (sunlight), earth (planting soil mix) and metal (steel frame cladding).

We are pleased to have contributed in the provision of a comfortable and conducive living environment where university academics, professionals, researchers and leading scientists are able to interact freely in a relaxing leisurely environment.



Green Wall at Park Royal Marina Bay Pool

Vertical Green

6 Raffles Boulevard, Singapore 039594



Photo Credit: Vertical Green

Designers' Commentary:

Parkroyal Collection Marina Bay (formerly known as Marina Mandarin Hotel) is transformed into a 'garden in a hotel' with its revamped design centric around caring for the environment. We contributed to this transformation using our expertise in vertical greenery. We created a beautiful green wall made of big leafy plants, such as *Monstera delicosa* and *Asplenium nidus* (bird's-nest ferns).

The green wall has been much appreciated by hotel guests as it is both aesthetic and functional with its screening purpose of shower facilities beside the green wall, exuding a luxe charm to the hotel.

Our wall installation exemplifies how green wall installation can be magnificent at onset of installation while allowing plants room for growth and also, how a beautiful green wall can be made functional at the same time.



Photo Credit: Vertical Green



Photo Credit: Vertical Green

The double-sided wall features big matured plants such as bird nest ferns & *Monstera deliciosa*. Given the size of these plants, their root balls needed a customised solution to install them onto the green wall and we managed to achieve this with their own hygrowall design.



Photo Credit: Vertical Green

VERTICAL GREEN

MARINA MANDARIN - HYGROWALL DESIGN



Monstera deliciosa



Magnolia fern



Xiphidium caeruleum

Asplenium nidus
(bird nest fern)

Phyllanthus myrsinites



Alocasia amazonica

Polystichum maximum
(ground fern)Pogonatherum
panicum

Coccoloba - Elephant Ear



Lycopodium



Philodendron selloum

Schefflera green
plant

Photo Credit: Vertical Green

The big plants procured were of 300mm root ball size for *Monstera deliciosa*, *Philodendron selloum* & *Alocasia macrarrhiza*, ~1200mm width from frond to fronds of the *Asplenium nidus*. While this will require a special method of installation, it is definitely possible for these plants to thrive as the roots are not limited by our felt system.

McDonald's at Vista Point

Vertical Green

Blk 548 Woodlands Drive 44, Vista Point,
Singapore 730548



Photo Credit: Vertical Green

Designers' Commentary:

We are honoured to work with McDonald's on this project as McDonald's is a household brand enjoyed by many. We are given the challenge of adding a green wall in the otherwise open sitting area. Once again, this green wall serves both aesthetic and functional purpose of cordoning the sitting area for their patrons. Both project owner and their patrons all feedback that they appreciate the green wall as it provides a better dining experience.



We faced with a couple of challenges in this project, namely:

- (1) Space constraint,
- (2) Extremely rushed timeline of only 2 weeks and
- (3) Tight budget.

To overcome these challenges, we customized an irrigation system specially for the client and overcame these challenges successfully.

