

Horizon 2020

URBAN GreenUP

# Singapore: Vertical Greening in high density city environments

26 Nov 2020

**YVONNE TAN**

Landscape Architect

DIRECTOR, DP GREEN PTE LTD (SINGAPORE)

Chairperson, Singapore Green Building Council Landscape Technical Committee

2<sup>nd</sup> Vice President, Singapore Institute of Landscape Architects

ABC Waters Professional Monitoring Committee (Singapore)

Landscape Excellence Assessment Framework Evaluation Panel



An overview of  
how Singapore  
promotes vertical  
greening, and  
where we are  
today

Encouraging  
private building  
owners to  
embrace green  
walls

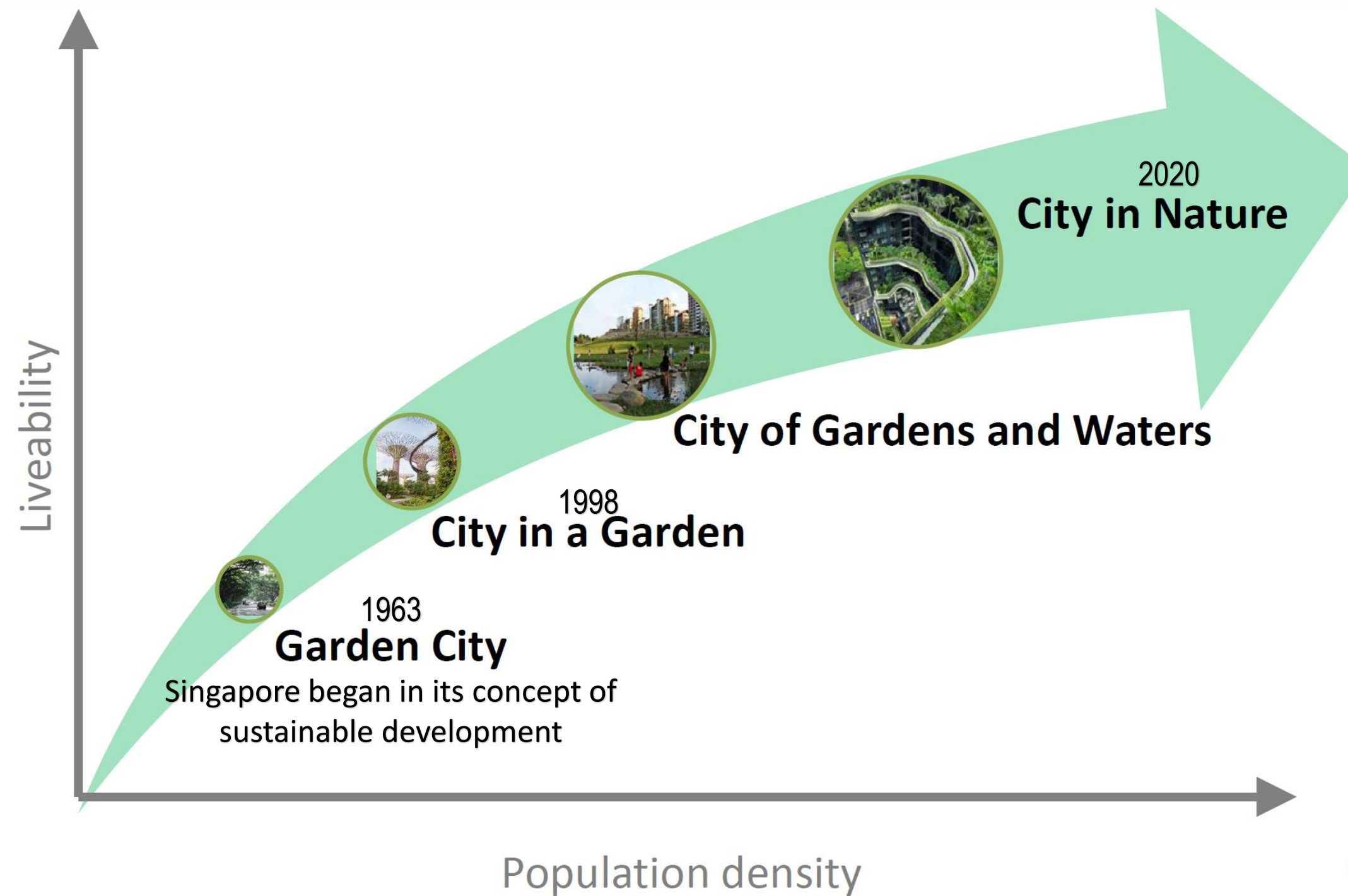
Lessons  
learned

keeping a green  
wall alive and  
maintaining it  
affordably





## *Building a City in Nature*







Greening Singapore- Garden City Vision  
at first Tree Planting Day (1971)

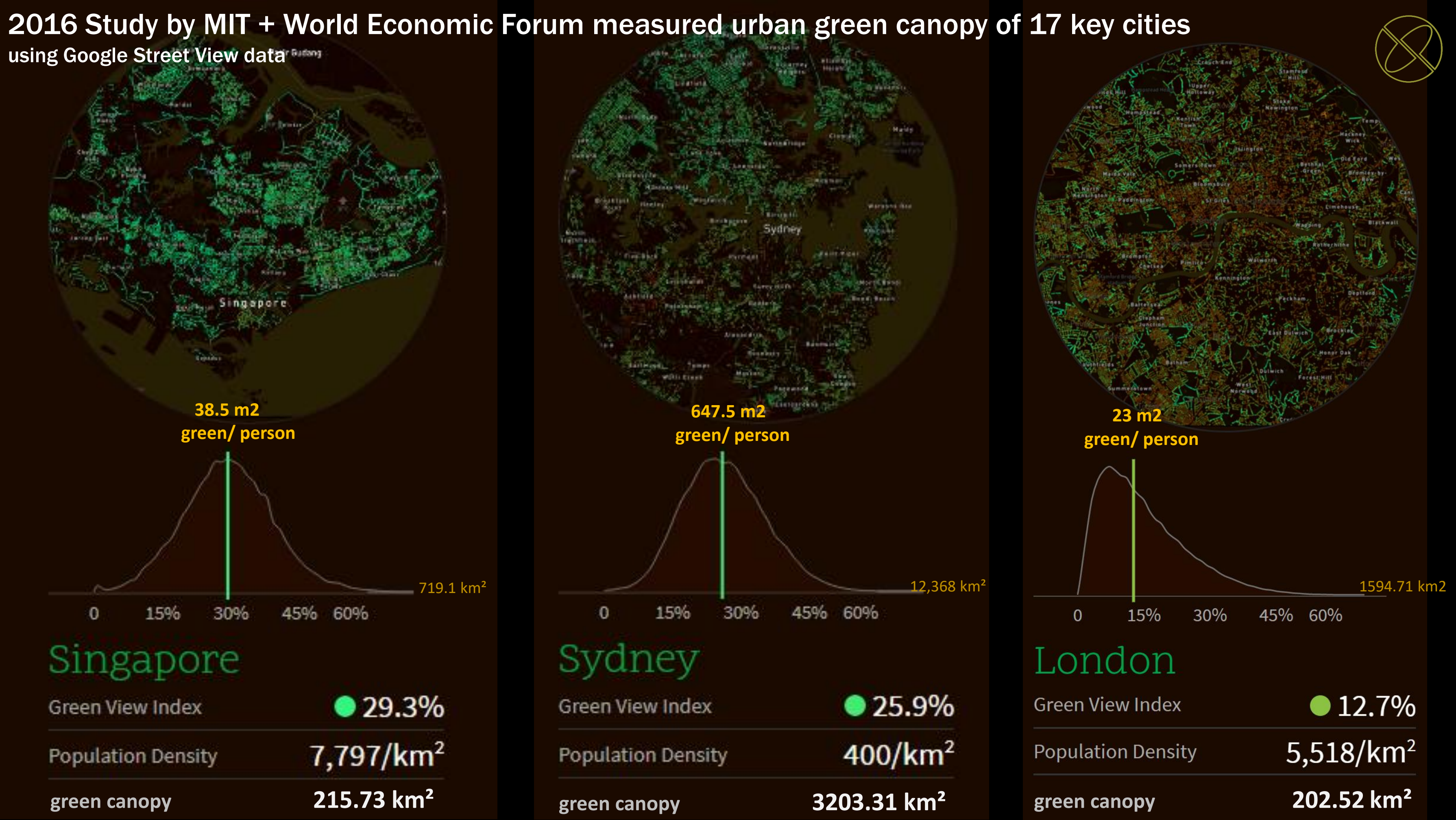


Opening of Gardens by  
the Bay (2012)

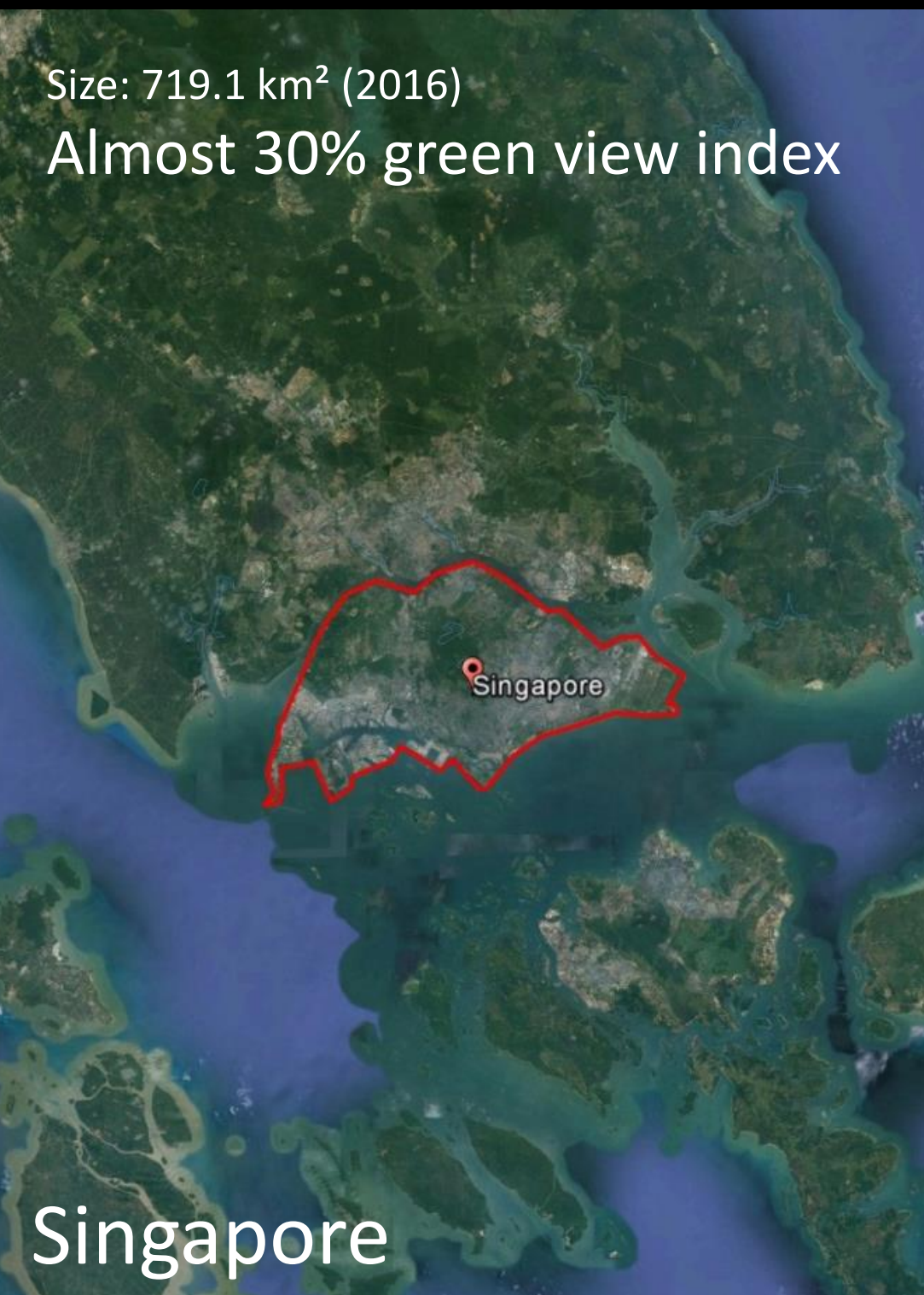


Singapore Botanic Gardens declared  
UNESCO World Heritage Site ( 2015)

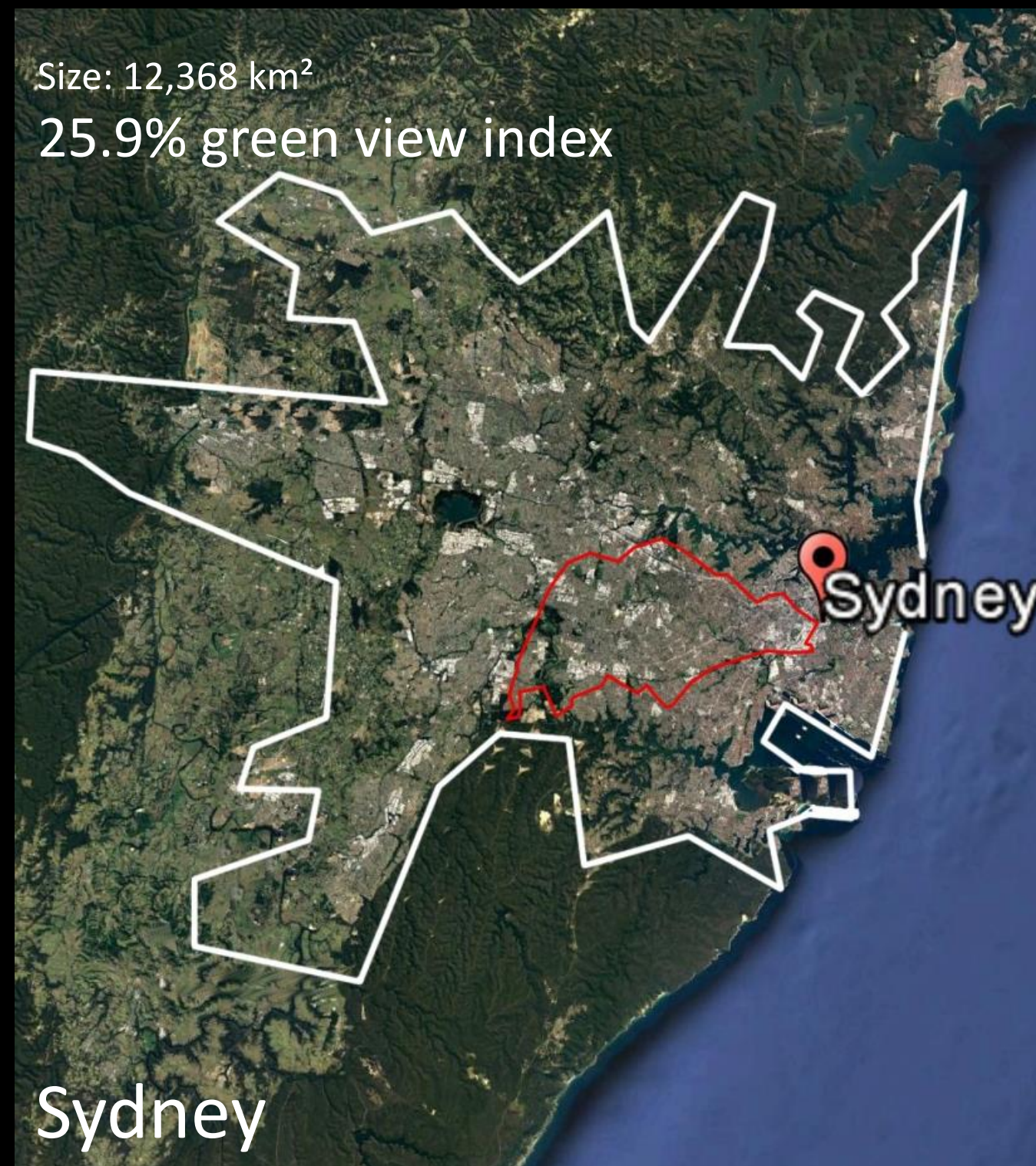








**215.73 km<sup>2</sup> green canopy**  
**38.5m2 green/ person**



**3203.31 km<sup>2</sup> green canopy**  
**647.5 m2 green/ person**



**202.52 km<sup>2</sup> green canopy**  
**23 m2 green/ person**



# Beyond the urban green canopy...

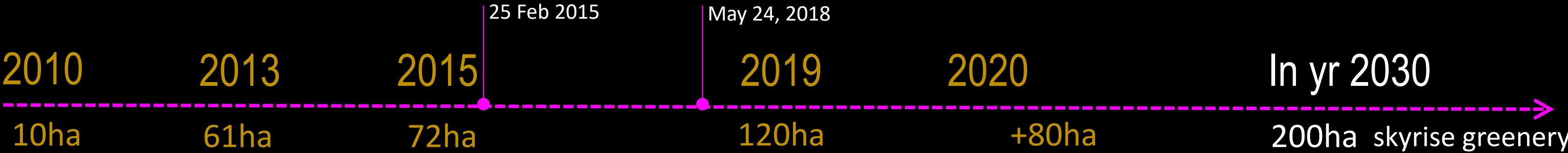


between 1986 and 2010, despite growth in population from 2.7 million to 5 million...

25/2/15, Landsat 8 (path/row 125/59) — Singapore



19/4/17, Landsat 8 (path/row 125/59) — Singapore





~~“City in a Garden”~~ > “City in Nature”

*+ 200ha  
nature parks*

*+ 140ha  
new gardens/parks  
next 5 yrs*

*More  
natural water  
ways/water bodies*

*conserve  
>70 native species*

*enhance 30ha  
habitats*

*+500km  
Park Connectors  
“within a 10 mins walk  
of a park”*

*+100K trees  
in Industrial estates*

***+300km**  
Nature Ways  
along roads*

***+80ha**  
**skyrise greenery**  
Total 200ha  
skyrise greenery*

----->  
Singapore 2030





Oasia Hotel,  
Courtesy of STX

© Helen Smith-Yee STX Landscape Architects. 2017 All Rights Reserved.



Oasis Terrace at Punggol, Integrated Development

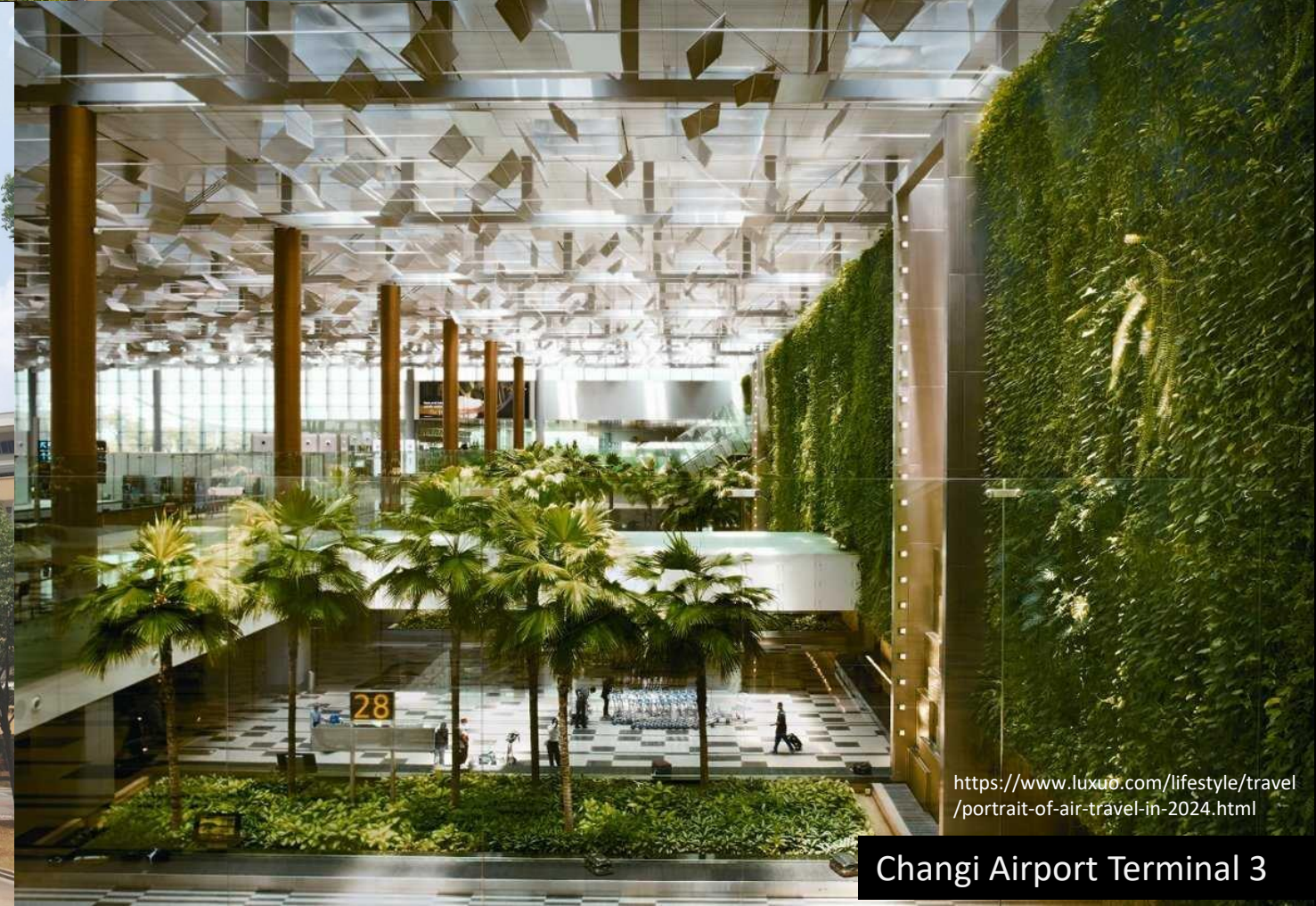


ITE College Central  
Courtesy of Elmich



Artist illustration  
from Tampines  
Town Council.

Tampines Public Housing



<https://www.luxu0.com/lifestyle/travel/portrait-of-air-travel-in-2024.html>

Changi Airport Terminal 3



An overview of  
how Singapore  
promotes vertical  
greening, and  
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# GREENING INITIATIVES by URA + NPARKS + BCA

have helped to intensify the integration of greenery with our high density developments

## Urban Renewal Authority (URA)

### LUSH 3.0

Landscaping for Urban  
Spaces and High-Rises  
(launched in 2009)

MANDATORY  
(REGULATORY)

Focus:

incentivises injecting greenery  
into developments through  
Landscape replacement Area  
(LRA) and quality of greenery  
and benefits to the community

## Building Control Authority (BCA)

Greenmark Scheme  
(launched in 2005)

MANDATORY  
(REGULATORY)

Focus:

all new buildings and existing  
buildings undergoing major  
retrofits. Target 80% all  
buildings certified by 2030.

## National Parks Board

### LEAF

*Landscape Excellence  
Assessment Framework*

INCENTIVES



Focus:

quality and ecological role of  
greenery and benefits to the  
community

*complementary initiatives*

*...perhaps the whole is greater than the sum of its parts.*



# LANDSCAPE REPLACEMENT AREAS (LRA) Guidelines in Strategic Areas



The Green Plot Ratio (GnPR) provides an objective measure of the density of greenery within a site.

| LRA Requirements for Developments in Strategic Areas |                                 |   |
|--|---------------------------------|---|
| Location   | Developments in Strategic Areas | Developments in Strategic Areas Outside Central Area, with Height Control ≤80m <sup>1</sup> |
| LRA (as a % of Site Area)                            | 100%                            | 70%   |
| Minimum softscape requirement (as a % of Site Area)  | 40%                             | 40%   |
| Minimum GnPR requirement (Total Leaf Area/Site Area) | 4.0                             | 4.0   |

<sup>1</sup> Building height is based on Singapore Height Datum (SHD).

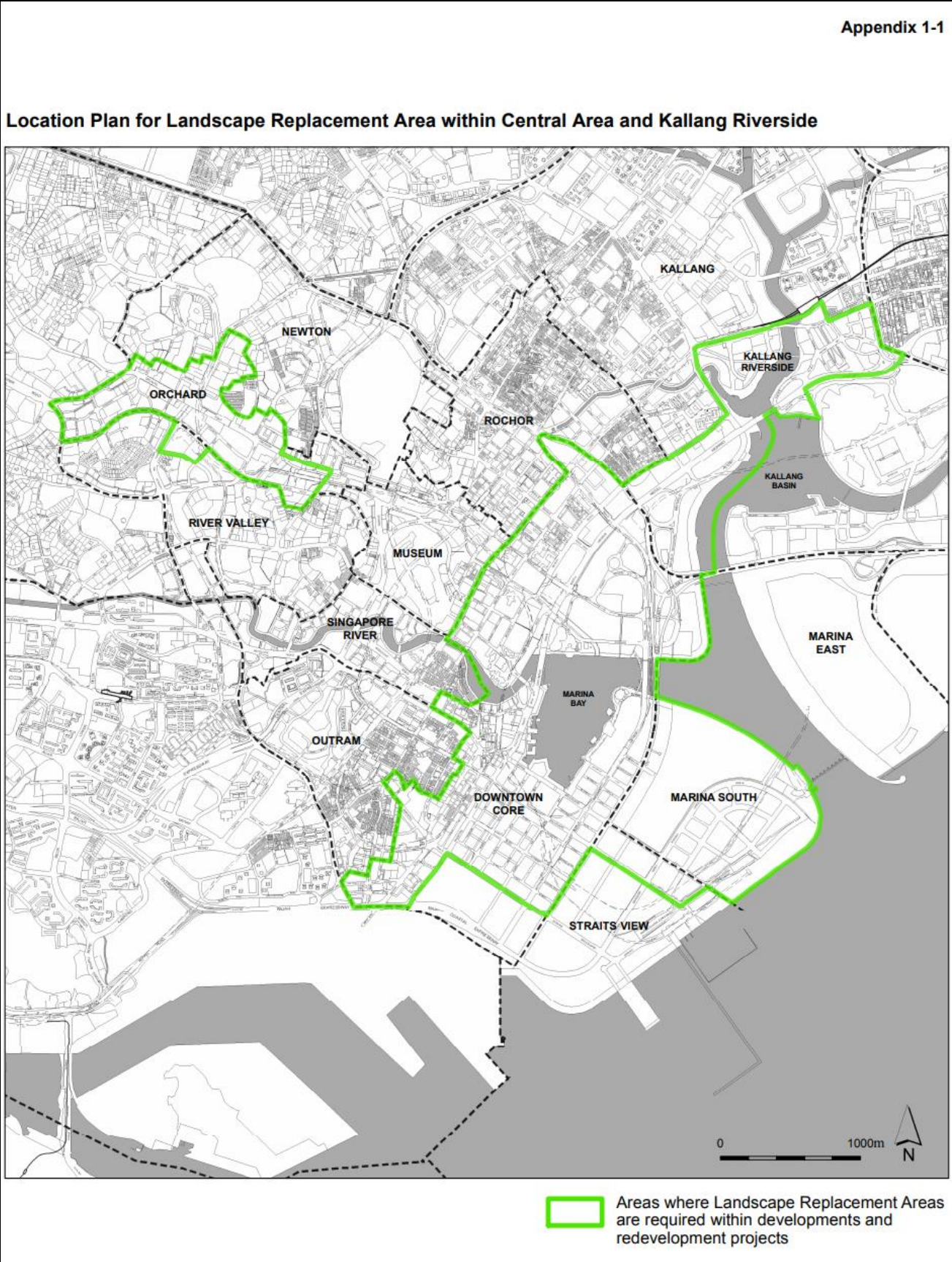
Total Leaf Area computed based on the **Leaf Area Index (LAI)** for each plant species, canopy area (for trees & palms) and the quantity planted. The plant species sub-categories and LAI values may be obtained online from NParks’ [Flora Fauna Web](#) by searching the common or scientific names of plants.

Green Plot Ratio

=

Total leaf area of greenery counted as Landscape Replacement (softscape)

Development Site Area

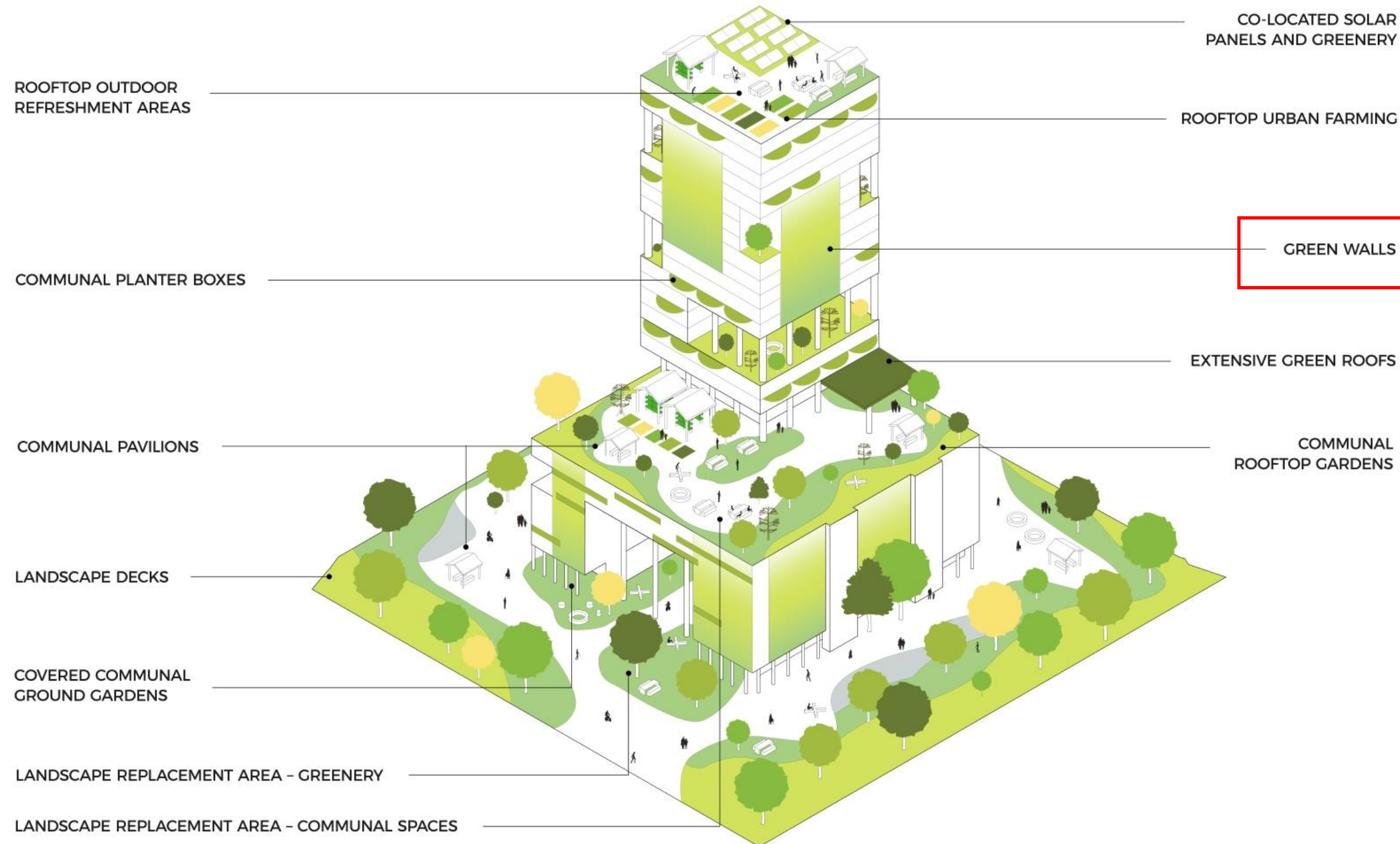


| Plan | Location  |
|------|---|
| 1-1  | <a href="#">Downtown Core (part), Straits View (part), Marina South, and Orchard (part) Planning Areas, as well as 2 mixed-use parcels along Orchard Boulevard in Paterson Hill Subzone</a> |
| 1-2  | <a href="#">Ang Mo Kio Planning Area</a>  |
| 1-3  | <a href="#">Bedok Planning Area</a>   |
| 1-4  | <a href="#">Bishan Planning Area</a>  |
| 1-5  | <a href="#">Boon Lay Planning Area</a>  |
| 1-6  | <a href="#">Bukit Batok Planning Area</a>   |
| 1-7  | <a href="#">Bukit Merah Planning Area</a>   |
| 1-8  | <a href="#">Bukit Timah Planning Area</a>   |
| 1-9  | <a href="#">Choa Chu Kang Planning Area</a>   |
| 1-10 | <a href="#">Clementi Planning Area</a>  |
| 1-11 | <a href="#">Geylang Planning Area (Paya Lebar Central)</a>  |
| 1-12 | <a href="#">Hougang Planning Area</a>   |
| 1-13 | <a href="#">Jurong East Planning Area</a>   |
| 1-14 | <a href="#">Kallang Riverside</a>   |
| 1-15 | <a href="#">Marine Parade Planning Area</a>   |
| 1-16 | <a href="#">Novena Planning Area</a>  |
| 1-17 | <a href="#">Pasir Ris Planning Area</a>   |
| 1-18 | <a href="#">Punggol Planning Area (Punggol Creative Cluster &amp; Learning Corridor)</a>  |
| 1-19 | <a href="#">Punggol Planning Area</a>   |
| 1-20 | <a href="#">Sembawang Planning Area</a>   |
| 1-21 | <a href="#">Sengkang Planning Area</a>  |
| 1-22 | <a href="#">Serangoon Planning Area</a>   |
| 1-23 | <a href="#">Tampines Planning Area</a>  |
| 1-24 | <a href="#">Toa Payoh Planning Area</a>   |
| 1-25 | <a href="#">Woodlands Planning Area</a>   |
| 1-26 | <a href="#">Yishun Planning Area</a>  |



# LANDSCAPE REPLACEMENT AREAS (LRA)

calibrated by location, GPR and development type.



LRA requirement not applicable to conserved buildings in historic conservation areas.

LRA in Strategic Areas is the sum of:

- 1) Horizontal surface area of the softscape eg permanent planting beds;
- 2) Horizontal surface area of the hardscape eg communal facilities, urban farm; and
- 3) Vertical surface area of green walls and extensive green roofs (if any).



## *biophilic design*

*(also green design)*

integrating natural elements into buildings  
eg. Being in or views to nature

sustainability in different ways

ecosystems help improve air quality;

provide natural temperature control forms;

channel natural lighting;

create spaces for growing food;

support urban ecology eg. Wildlife;

fostering a stronger community and wellbeing

## *green design*

*(not all green features can be considered biophilic)*

focuses on sustainability of buildings through  
**safe, effective, and efficient use of resources**

*“Does this feature contribute to reducing energy and water usage?”*,

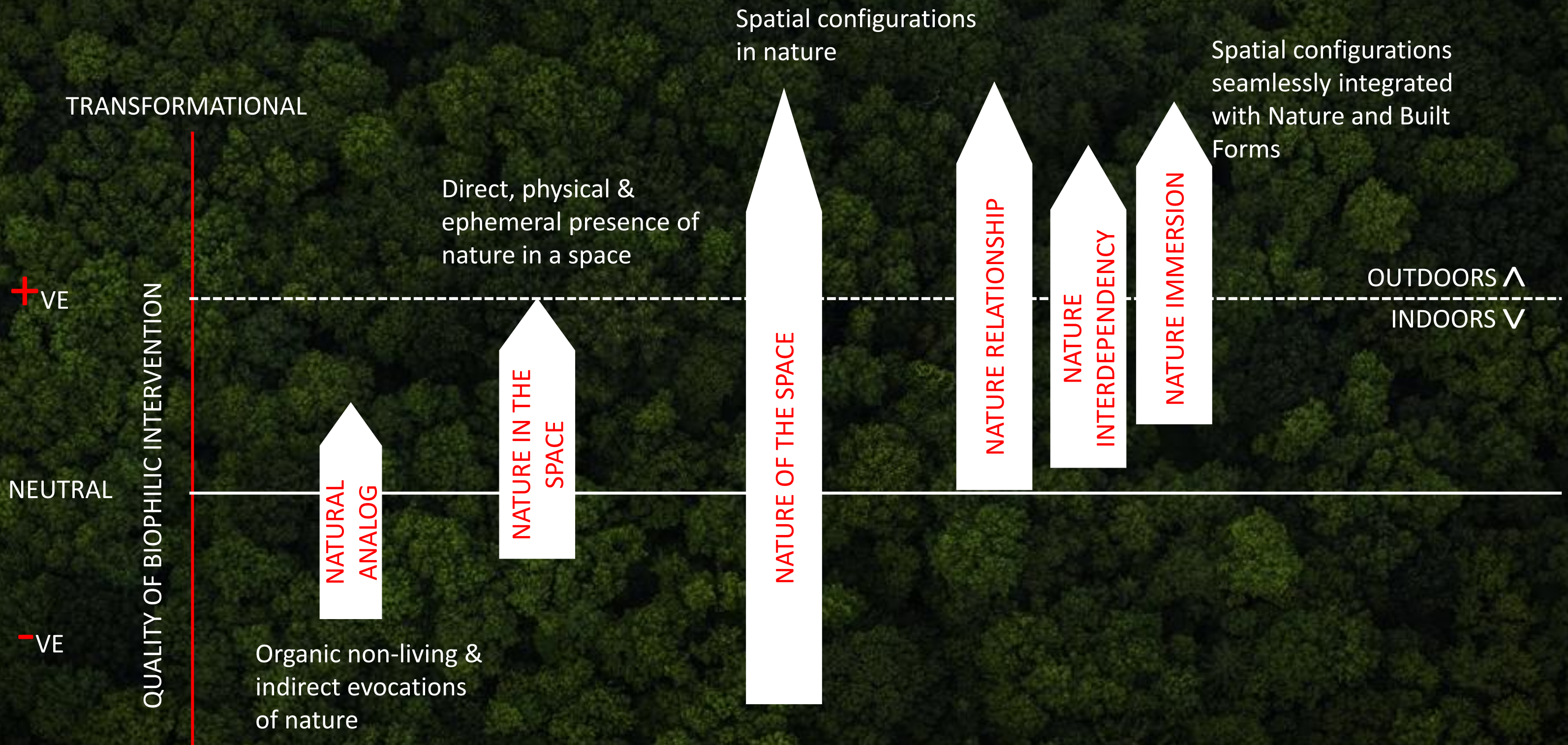
*“Is this material safe for the environment?”*,

*“Can we incorporate renewable energy sources to this building*

*“Can we achieve thermal comfort with natural ventilation instead of air-conditioning?”*



# EFFICACY OF BIOPHILIC INTERVENTIONS







SOCIAL



ECONOMICS



ENVIRONMENTAL



OPTIMISATION



SYNERGY



SINGAPORE

Gross Floor Area (GFA)

120,450 sqm

Plot Ratio

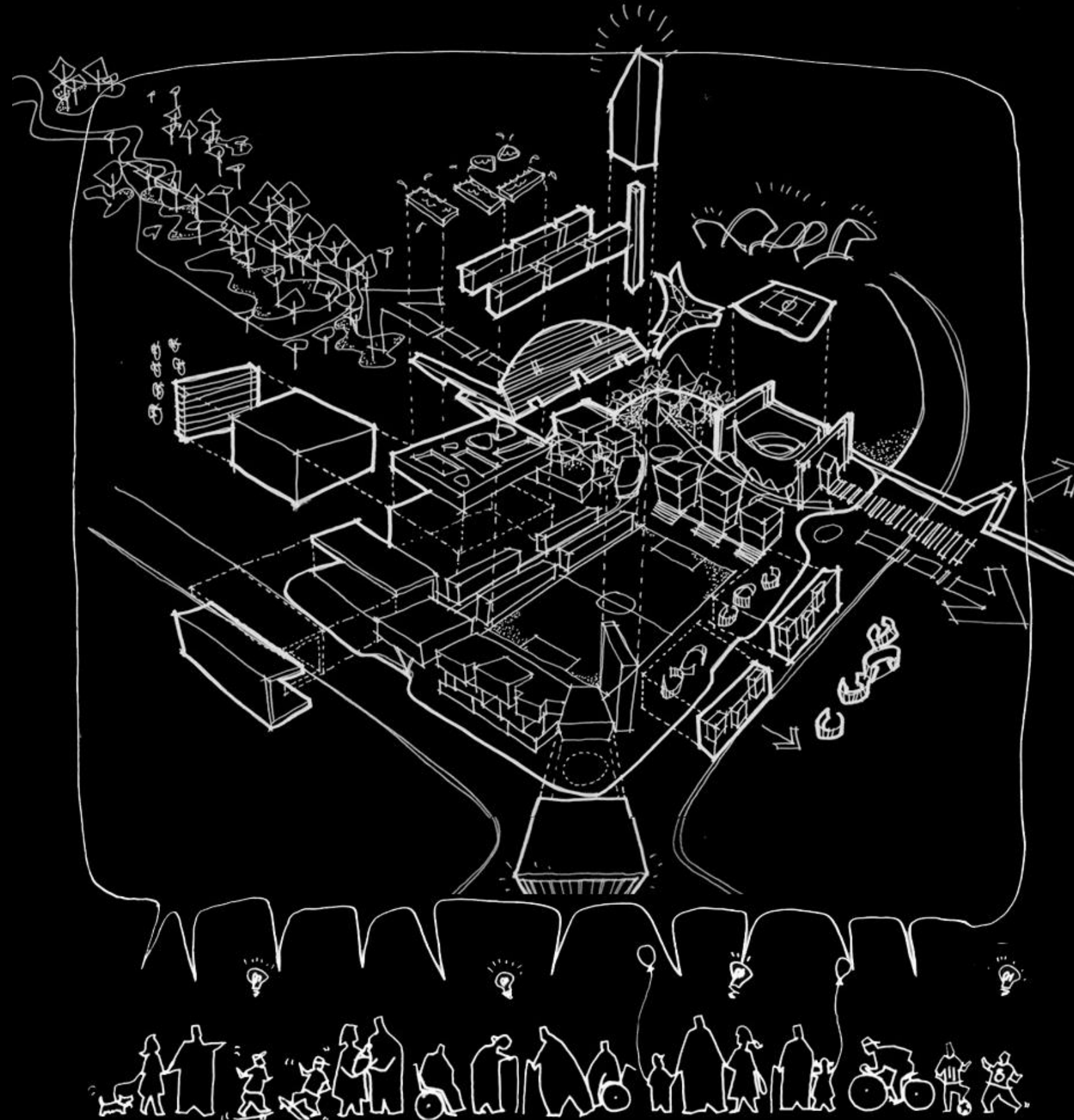
2.14 (permissible 2.8)

Site Area

56,800 m2

Courtesy of DP Architects and Landscape Architect: DP Green

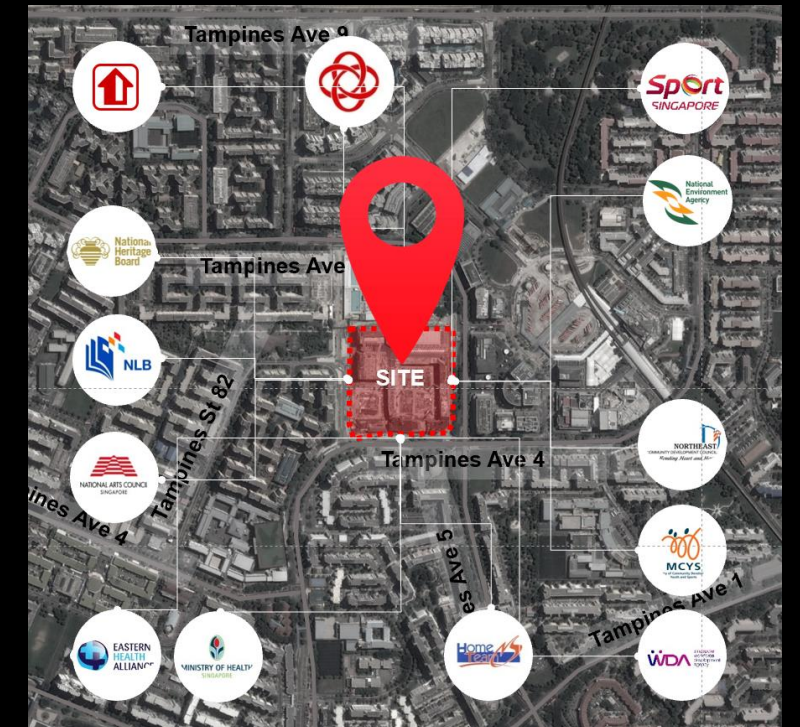




12 public  
agencies  
+  
residents

For, by & with  
**COMMUNITY**

A Whole-Of-  
Government  
Approach



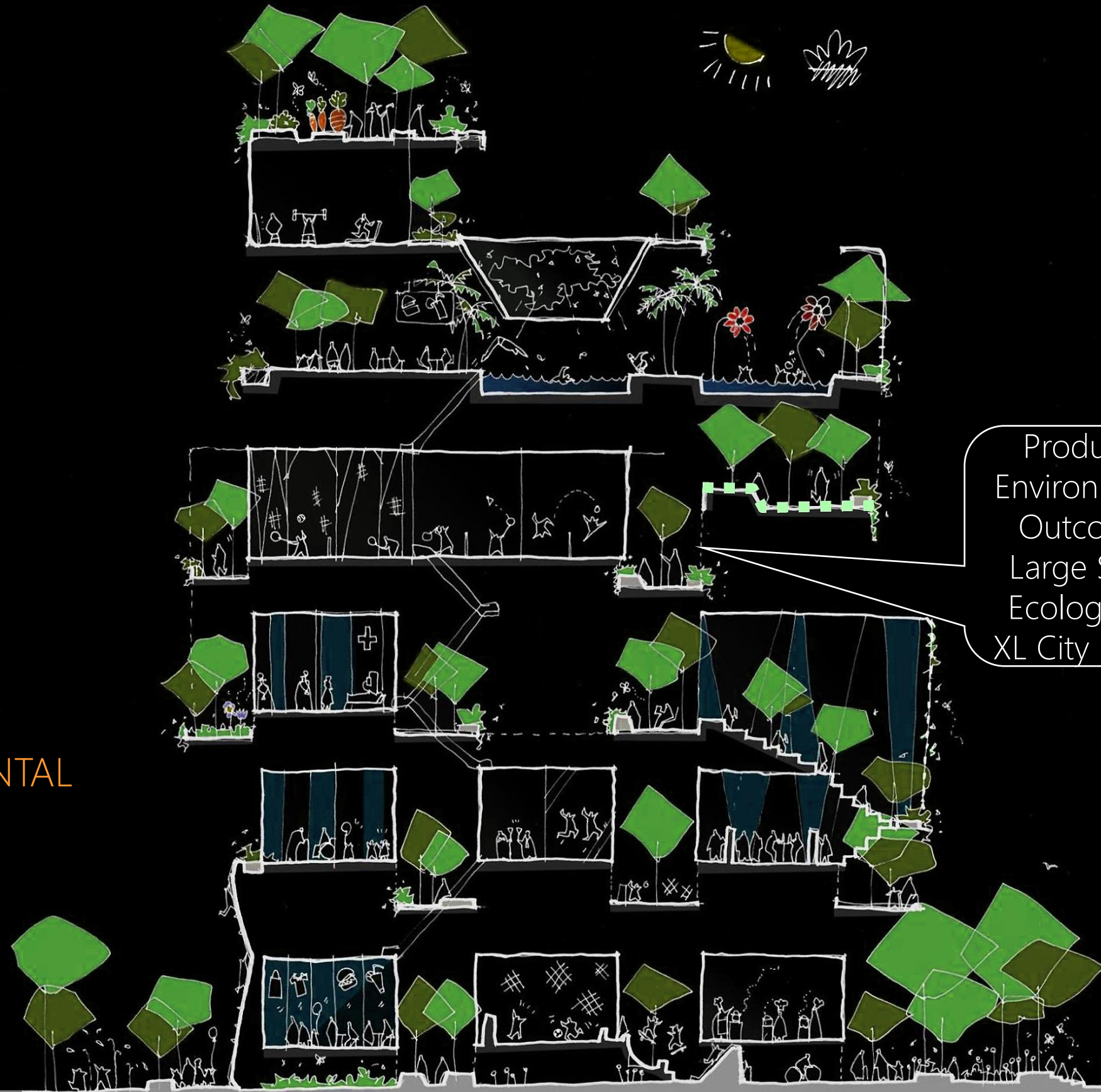




02



ENVIRONMENTAL



Producing Environmental Outcomes: Large Smart Ecology and XL City Rooms



A place of many places



Courtesy of DP Architects and Landscape Architect: DP Green





Green carpet/Unifier

Diverse programmes,  
Interlocking /overlapping

Public thorough-fare/  
Community Art/ F&B



# Porosity & Scale

Multiple uses & grounds

Event Plaza/  
Eco-community gardens

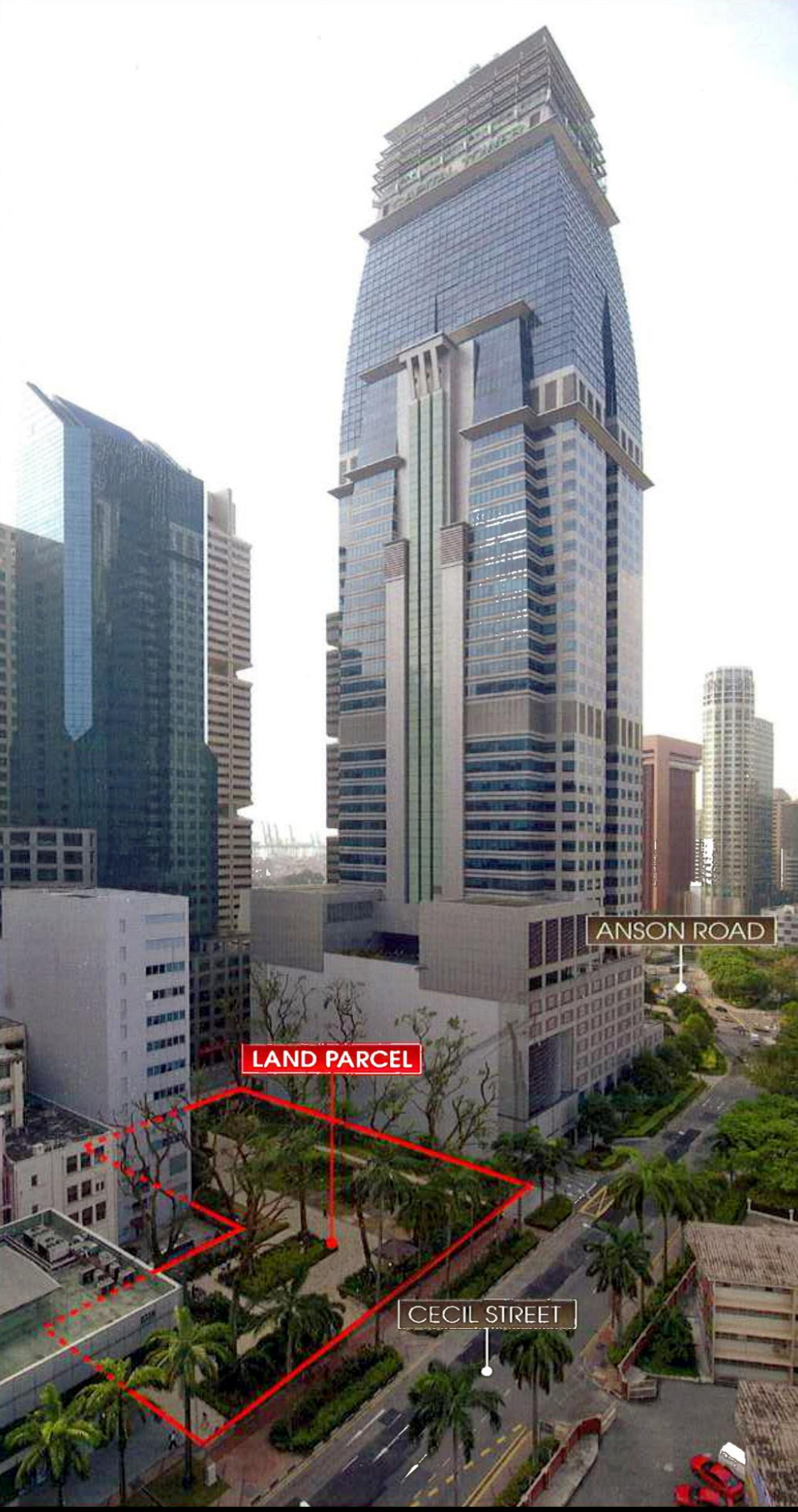
Large programmatic  
spaces

Shared  
domains

Humanized-  
scale spaces

Indoor community  
hall





# SBF Centre

(Mix Use- Offices & Medical suites)



Location:  
Along Robinson Road & Cecil Street

Program Usage  
Office Building, Medical Clinic, F&B

Gross Floor Area (GFA) – 34,839sqm  
Building Height – 31 Storeys

Green Mark Current Score 102pts  
Energy Savings –30.5%  
Landscape Replacement Area  
(LRA)- 100%  
GnPR - 8.4

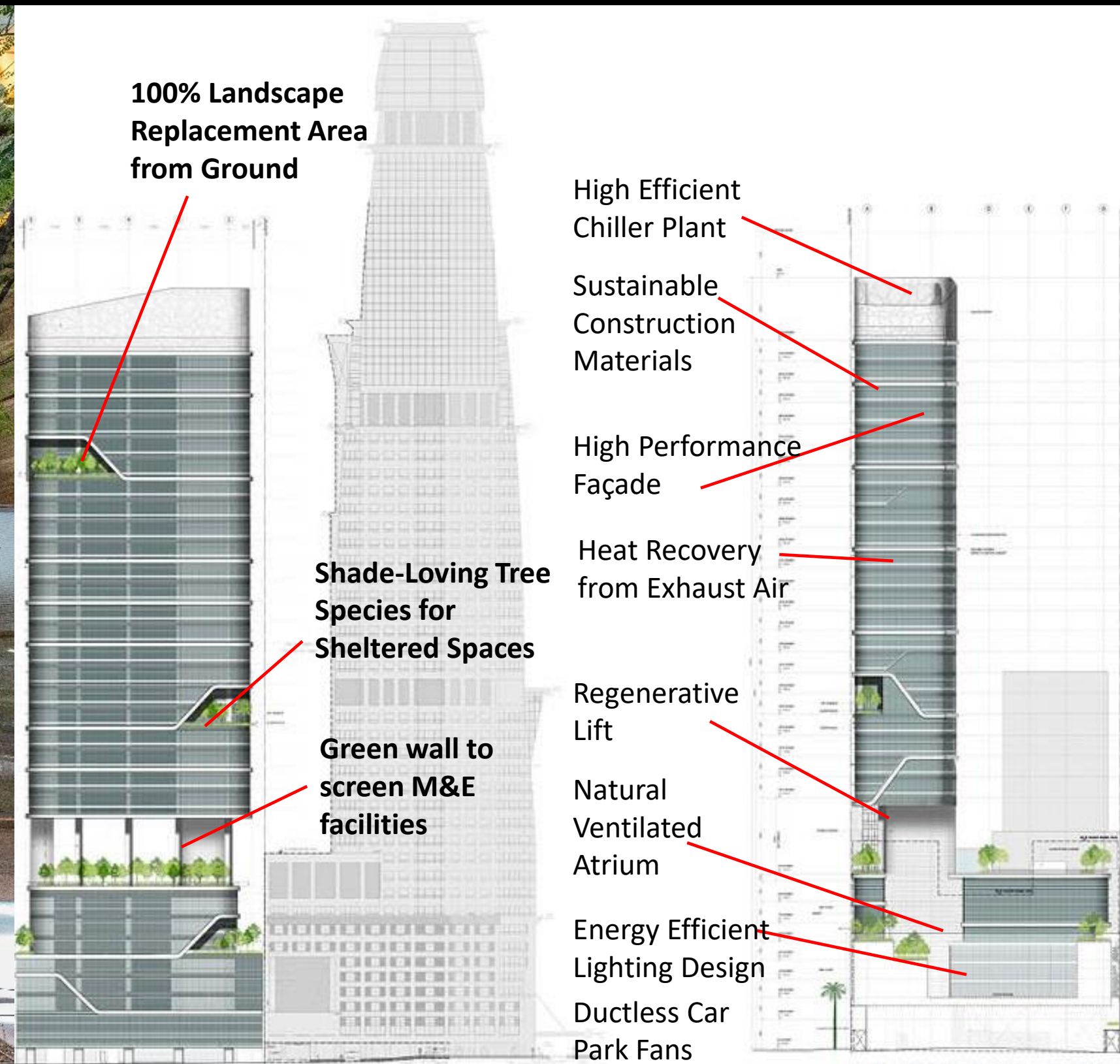
## Key Green Strategies

1. Lower Urban Heat Island Effect
2. Appropriate Plant Species Selection in Existing Daylight Conditions
3. Innovative Greening from the ground up

Courtesy of DP Architects and Landscape Architect: DP Green



# 100% Landscape Replacement Area and Green Walls to screen Mechanical & Engineering facilities



SBF Center (Office, Medical Suites, Service Apartments, Retail), SINGAPORE

Courtesy of Landscape Architect: DP Green





Total green area 24,817m<sup>2</sup>  
Site area 2,932m<sup>2</sup>  
Green Plot Ratio (GnPR) 8.46

Courtesy of Landscape Architect: DP Green

Key Green Strategies  
Shared landscapes



An overview of  
how Singapore  
promotes vertical  
greening, and  
where we are  
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Encouraging  
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# Increasing spatial complexity of public realm & landscape requires risk management in providing access and maintenance issues

## Situations:

While providing **visual-spatial-relief** to high density urban environment, skyrise greenery are **elevated environments**, with diverse **Work-At-Height** conditions.

## The Need:

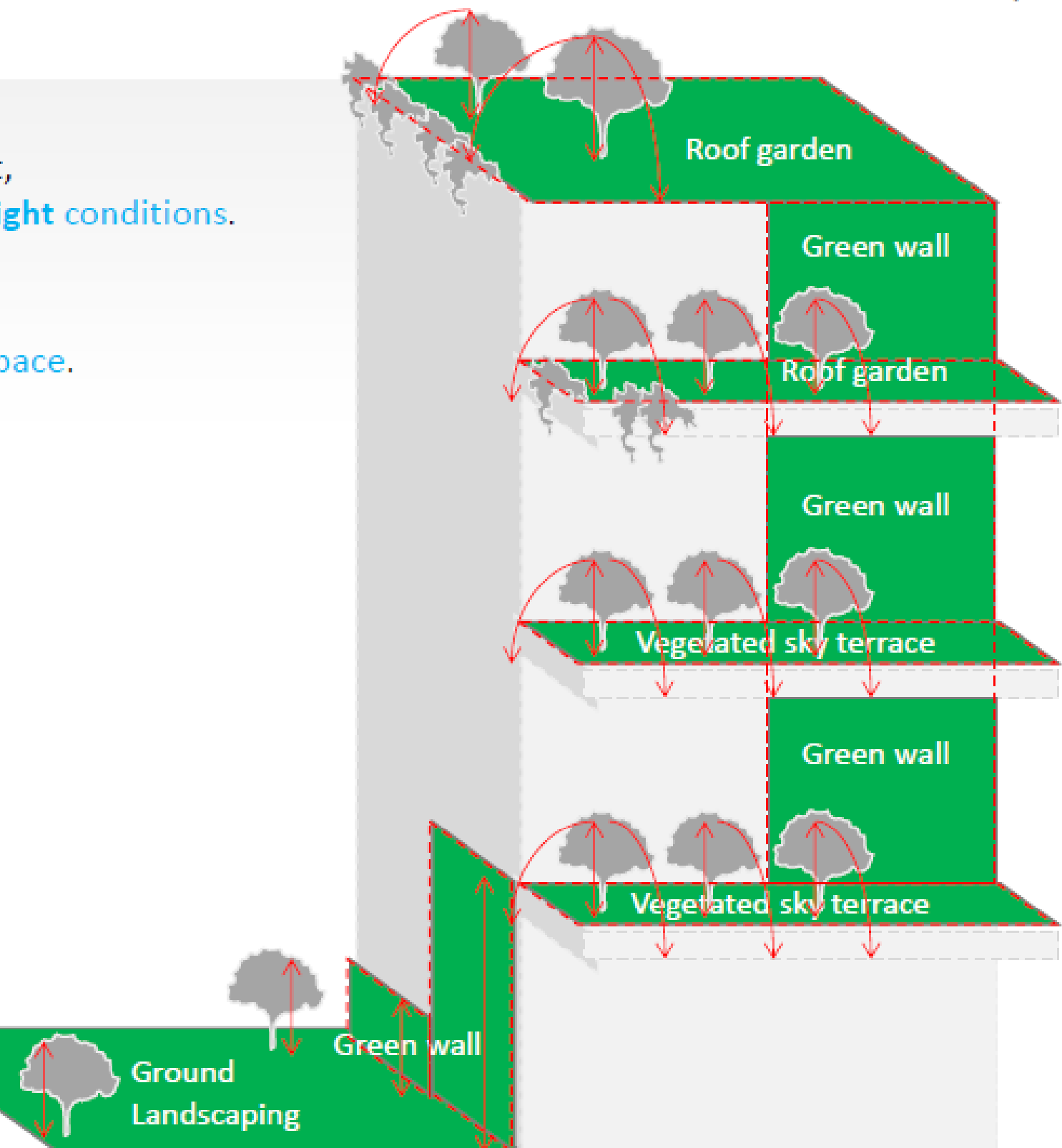
Understand and create **Safe-Access & Egress** and **Safe-Elevated-Workspace**.  
Look at ways to address these **elevated edge conditions**.

## **Concerns ( in skyrise greenery contexts ):**

- Work-At-Height (along roof edges)
- Risk of falling objects
- Risk of falling bio-debris

## SKYRISE GREENERY FORMS

Design Challenges | Design Opportunities





## DESIGN FOR SAFETY REGULATION (MOM)

With effect from 01 Aug 2016

a. To place duties on developers and designers

The Regulations will place duties on developers and designers to identify and address foreseeable risks throughout the lifecycle of a construction project. Where risks cannot be mitigated by design interventions, it will have to be communicated to those involved in the construction project.

e. To mandate it for projects with contract value of \$10 million and above

For a start, we propose for the Regulations to apply only to projects with contract value of \$10 million and above. Over the last two years, about 80% of fatal accidents and dangerous occurrences in the construction industry were contributed by projects with contract value of \$10 million and above.

Source: [www.wshc.sg](http://www.wshc.sg)



### Gazette of WSH (Design for Safety) Regulations 2015

The WSH (Design for Safety) Regulations has been gazetted and published on 10 July 2015. It will come into operation on 1 August 2016.

#### About the new Regulations



The key provisions of the WSH (DFS) Regulations are:

a. To place duties on developers and designers


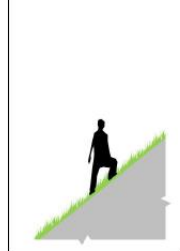

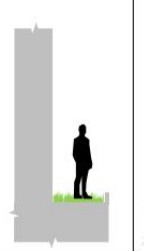


The Regulations will place duties on developers and designers to identify and address foreseeable risks throughout the lifecycle of a construction project. Where risks cannot be mitigated by design interventions, it will have to be communicated to those involved in the construction project.

Centre for Urban Greenery & Ecology  
CUGE Standards

### GUIDELINES ON DESIGN FOR SAFETY OF SKYRISE GREENERY

CS E11:2014



| Green roof  |   | Roof garden   |   | Vertical greenery   |   |
|---|---|---|---|---|---|
| Working near green roof edge with low or no parapet                                 | Working on pitched green roof   | Reaching out beyond roof edge   | Working on narrow planted ledge with low or no parapet                              | Vertically accessing crown of rooftop tree/palm                                     | Vertically accessing the top of tall green wall beyond 3m height                    |
|  |  |  |  |  |  |



The CUGE Standard series is a set of published guidelines, by CUGE Research, National Parks Board (Singapore), for adoption in the landscape and horticulture industry. They are written through a formal process that involves consultation with relevant bodies and reaching a consensus across all interested parties. The standards take the form of either specifications, methods, vocabularies, codes of practice or guides.

ISBN 978-981-09-1217-8

- The CS E11:2014 – has been developed in consultation with relevant industry bodies and professional groups in Singapore (i.e. BCA, ACES, IES, SCDF, SIA, SILA, LIAS, MOM, WSHC, IPAF, PASMA and the Ladder Association). It is written with the aim to encourage early easy uptake of Design-for-Safety (DfS) concept(s) by design professionals (i.e. architects, landscape architects, relevant consultants, etc.) during design-phase.
- The document also serves as a useful design-framework, especially for developers and owners.
- Designers are forerunners of spatial programming/design for any development project. Several factors crucial to DfS, such as safe access and fall protection, are essentially spatial considerations.
- In essence, during design phase, designers have the power to define DfS conditions/provisions.

Courtesy of CUGE



# Vertical Greenery Maintenance methods



Ladder



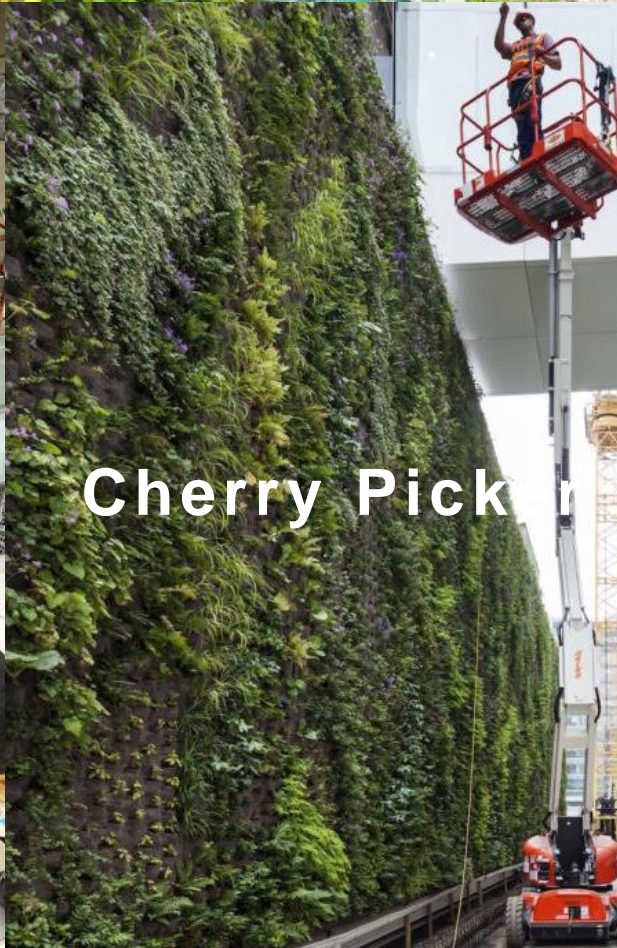
Gondola



- Aerial lift
- Ladders
- Scaffolding
- Gondola like system
- Workers on stilts
- Extendable props
- It's maintenance free!



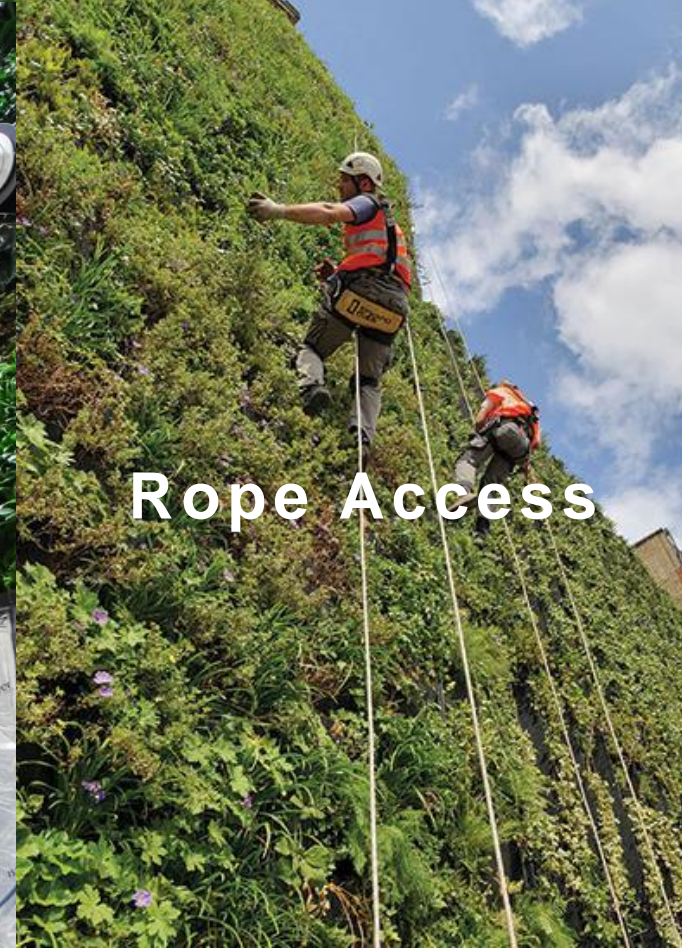
Scissor Lift



Cherry Picker



Scaffold



Rope Access



# Design considerations\_ Back Access Maintenance DFS good practices



**Project:** Ocean Financial Centre - Green Wall  
**Client:** Ocean Properties LLP  
**Project Manager:** Keppel Land International Limited  
**Main Contractor:** Obayashi-WOH HUP JV  
**Project Architect:** Architects 61  
**Landscape Architect:** Tierra Designs (Pte) Ltd  
**Green Wall Specialist Contractor:** Consis Engineering Pte Ltd  
**Report Period:** Jan-May 2013

**Total Length** – 110 m approximated  
**Total Height** – 19 m approximated  
**Total species of plants** -25  
**Approximate total area** - 2100 sqm, or 8 tennis courts



## VERTICAL GREEN WALL FEATURE INFO

|                              |             |
|------------------------------|-------------|
| TOTAL LENGTH OF GREEN WALL   | 110 M       |
| TOTAL HEIGHT OF GREEN WALL   | 19M average |
| TOTAL AREA OF GREEN WALL     | 2100 SQM    |
| TOTAL NO. OF POTTED PLANTS   | 54,549      |
| TOTAL NO. OF PLANT VARIETIES | 25 species  |

Ocean Financial Center (Modular Potted System) courtesy of Tierra





- Full carpark storey is installed with maintenance access walkway behind the greenwall
- Double life lines are provided to prevent fall from walkway
- Fully Professional Engineer (PE) designed/ certified
- For mezzanine level, “double decked” maintenance walkway with full railings are provided
- “lift, Tilt, Lock” system
- Class 0 non combustible fire rating
- Acrylonitrile Butadiene Styrene (ABS) graded high strength plastic material

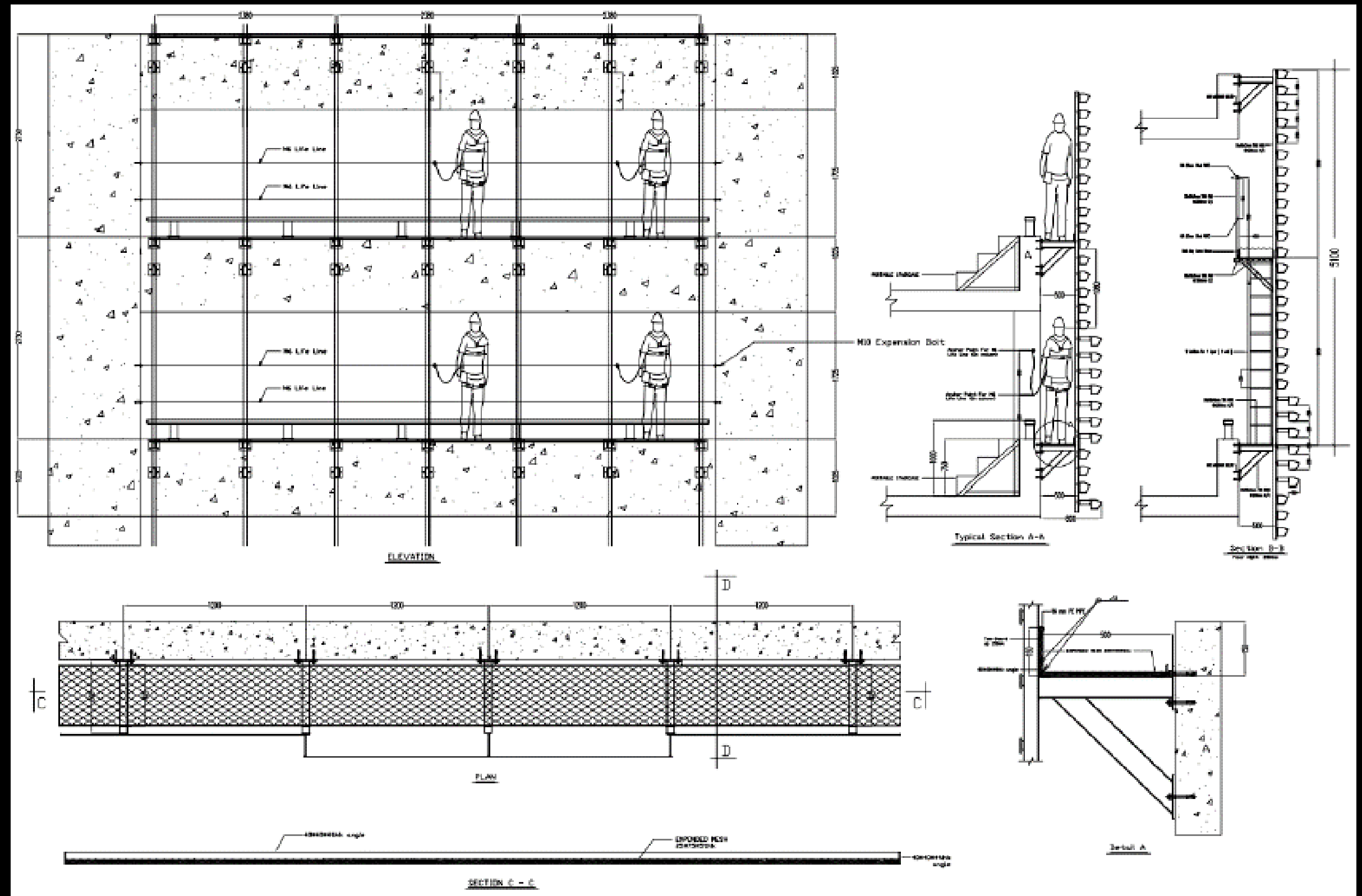


**Ocean Financial Center** (Modular Potted System)

courtesy of Tierra



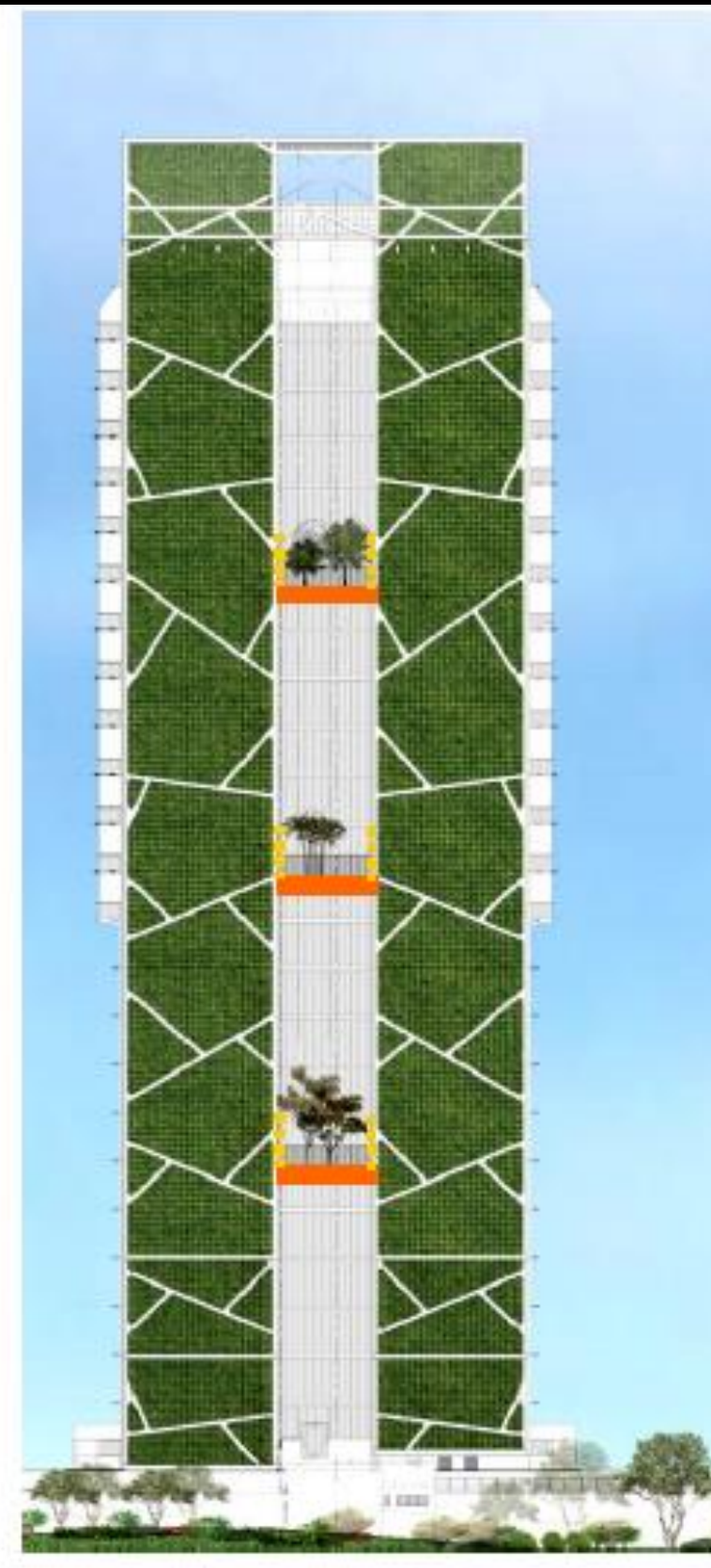
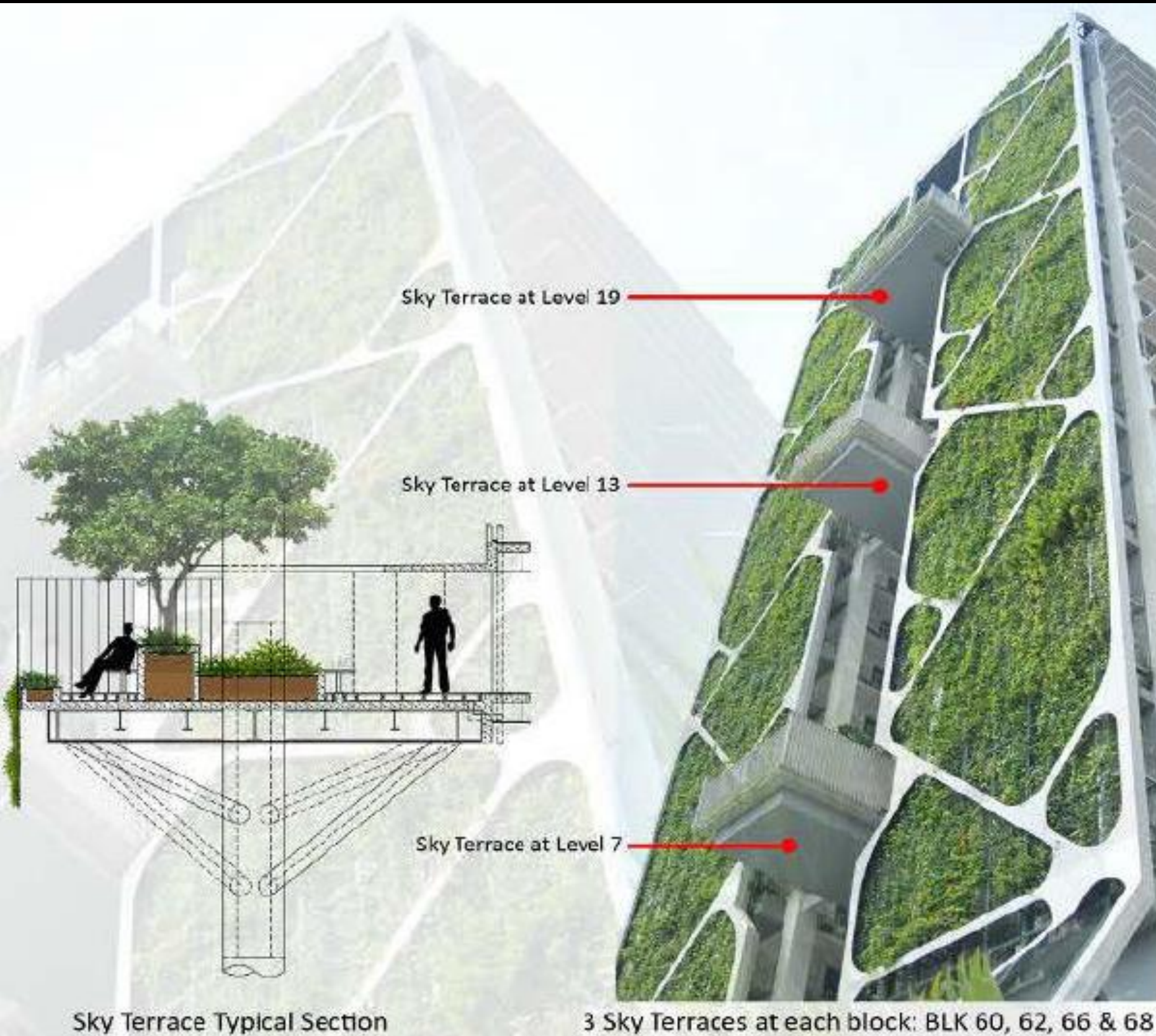
# Design considerations\_ Back Access Maintenance DFS good practices



Ocean Financial Center (Modular Potted System)

courtesy of Tierra





*Thunbergia grandiflora*



*Bauhinia kockiana*

Courtesy of COEN International (Landscape Architect) and ADDP (Architect)



# Design Intent vs reality





# Design considerations\_ Front and Back Access Maintainance

Use of long arm pruner telescopic  
1.8 to 3m with saw to prune  
external greenery



Grates for accessing  
planters during  
maintenance



Service corridor  
at every level



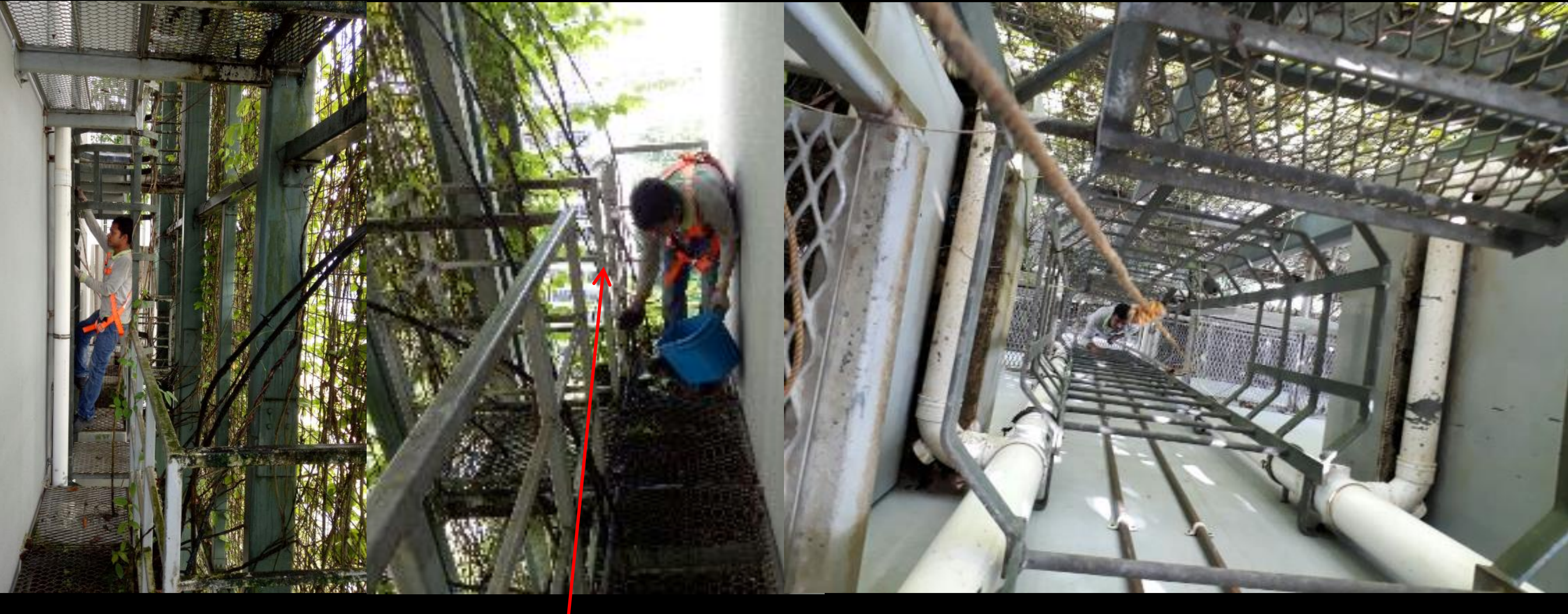


TOP 2013



photo taken in 2018



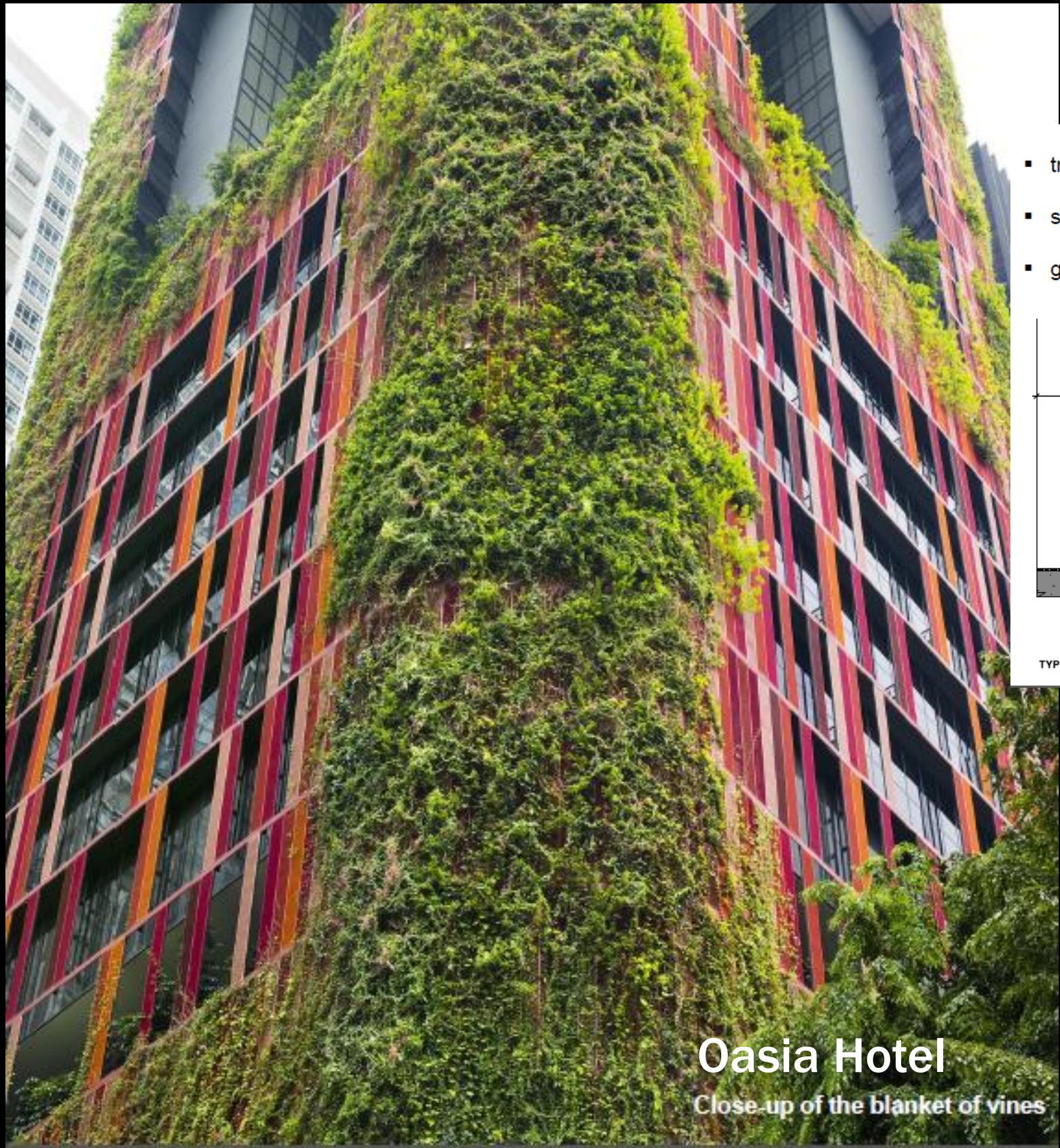


**Use of modified long arm pruner telescopic 6m  
with saw to prune external greenery**





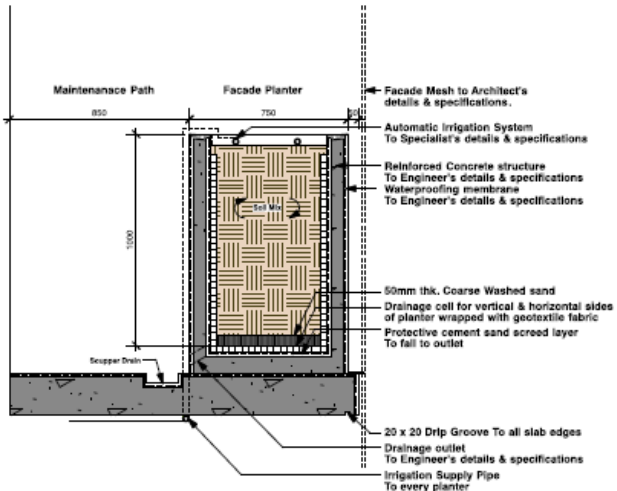
Maintenance access at Oasia



Oasia Hotel

Close-up of the blanket of vines

- trees – 1.5m soil
  - shrubs – 900mm soil
  - groundcovers – 600mm soil
- ↑ soil    ↑ health  
↓ maintenance  
↑ sustainability  
↓ irrigation



TYPICAL SECTION OF FACADE PLANTER



# Design considerations\_ Front and Back Access Maintainance

© Helen Smith-Yeo STX Landscape Architects. 2015 All Rights Reserved.

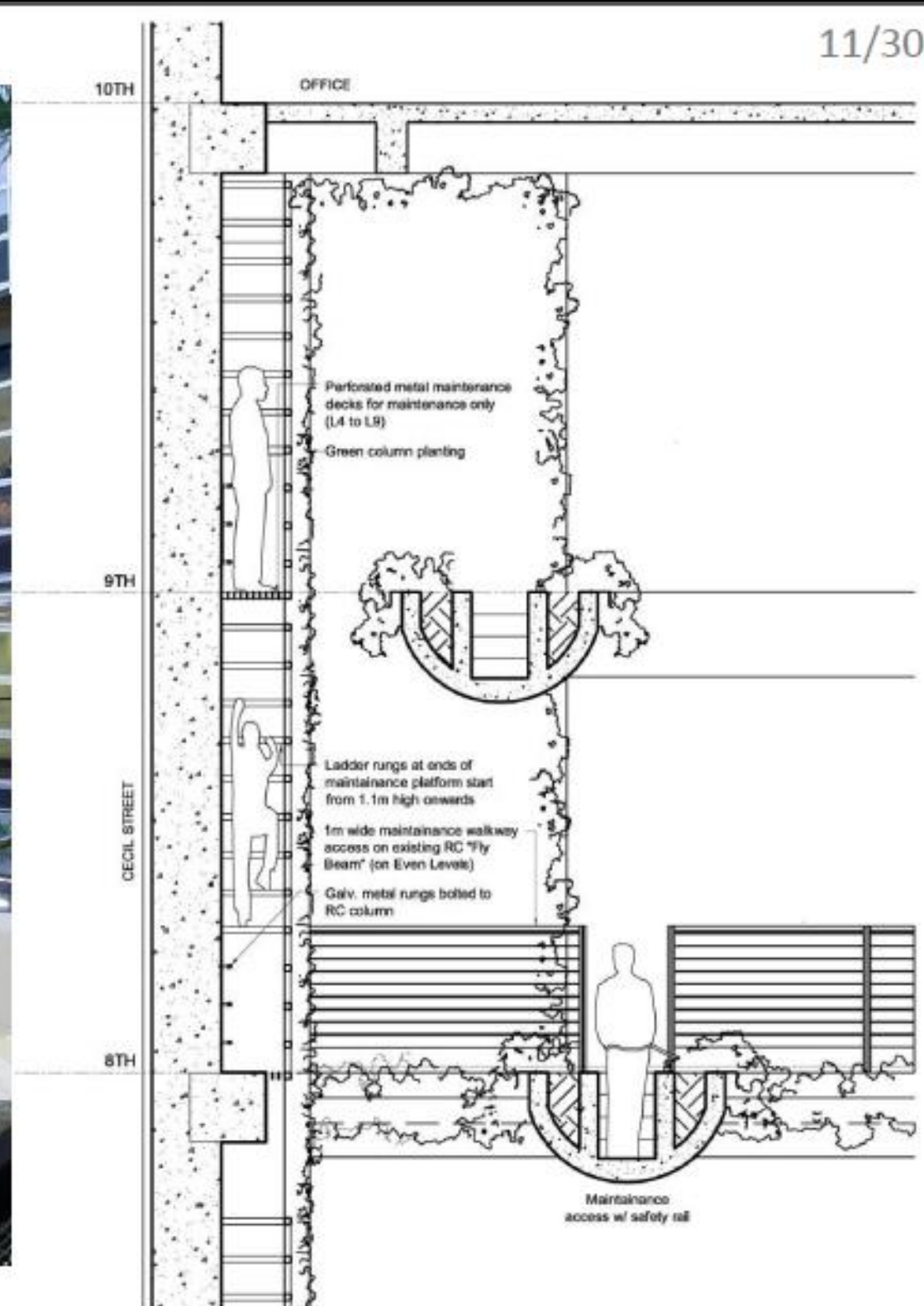
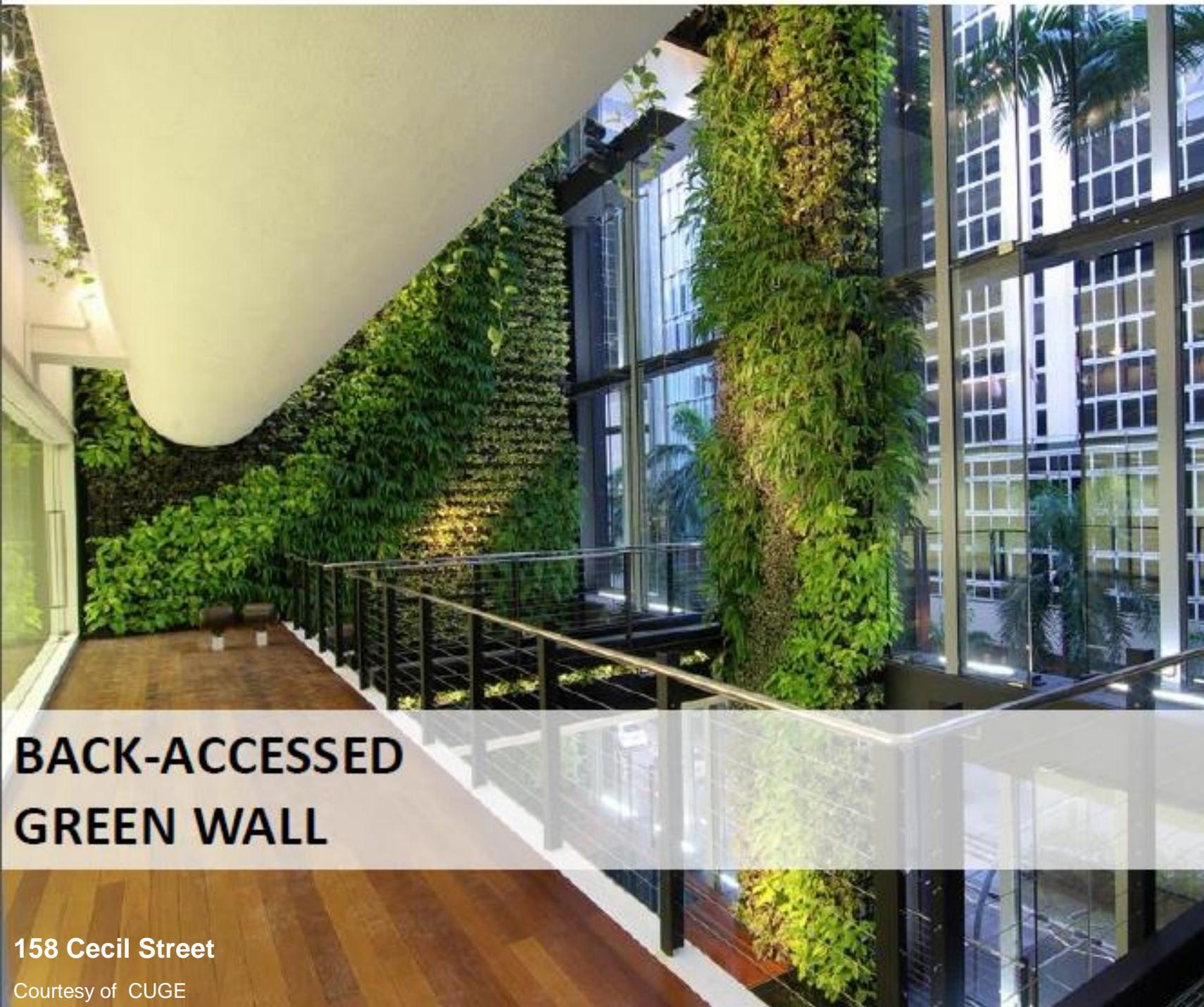
The actual position of the different species of plants on the facade were determined by several factors - tolerance to sun, rate of growth, tolerance to shade - in order to balance the coverage of the building facades in the shortest time possible.





# design considerations

## Back Access Green Walls







A combination of:

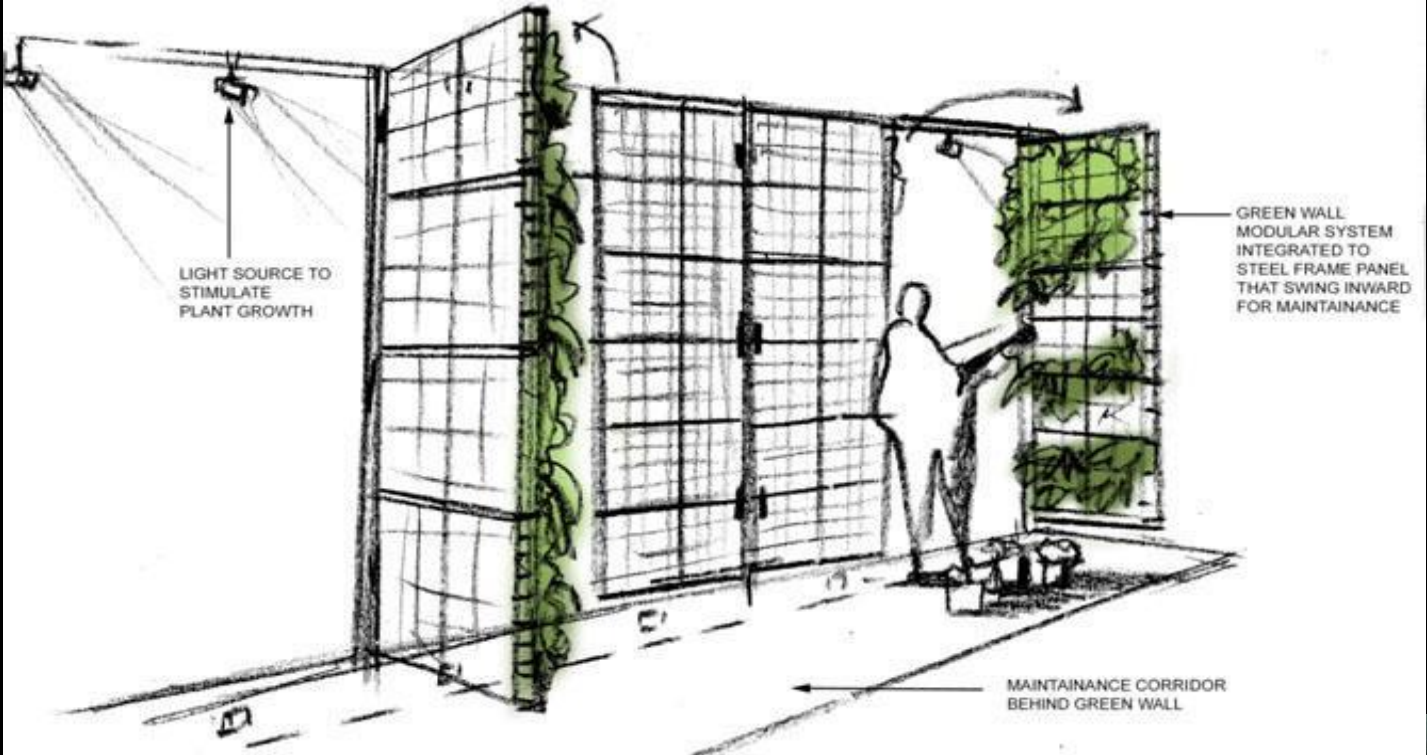
- (1) Back-access-way
- (2) Adequate clearance ( $>600\text{mm}$ )
- (3) Grate above rooting substrate (*avoids compaction from walking directly on substrate*)
- (4) Internal guardrail (*allows future replacement of mesh modules*)



Courtesy of CUGE



# Design considerations\_ Back Access Maintenance Good DFS Practices



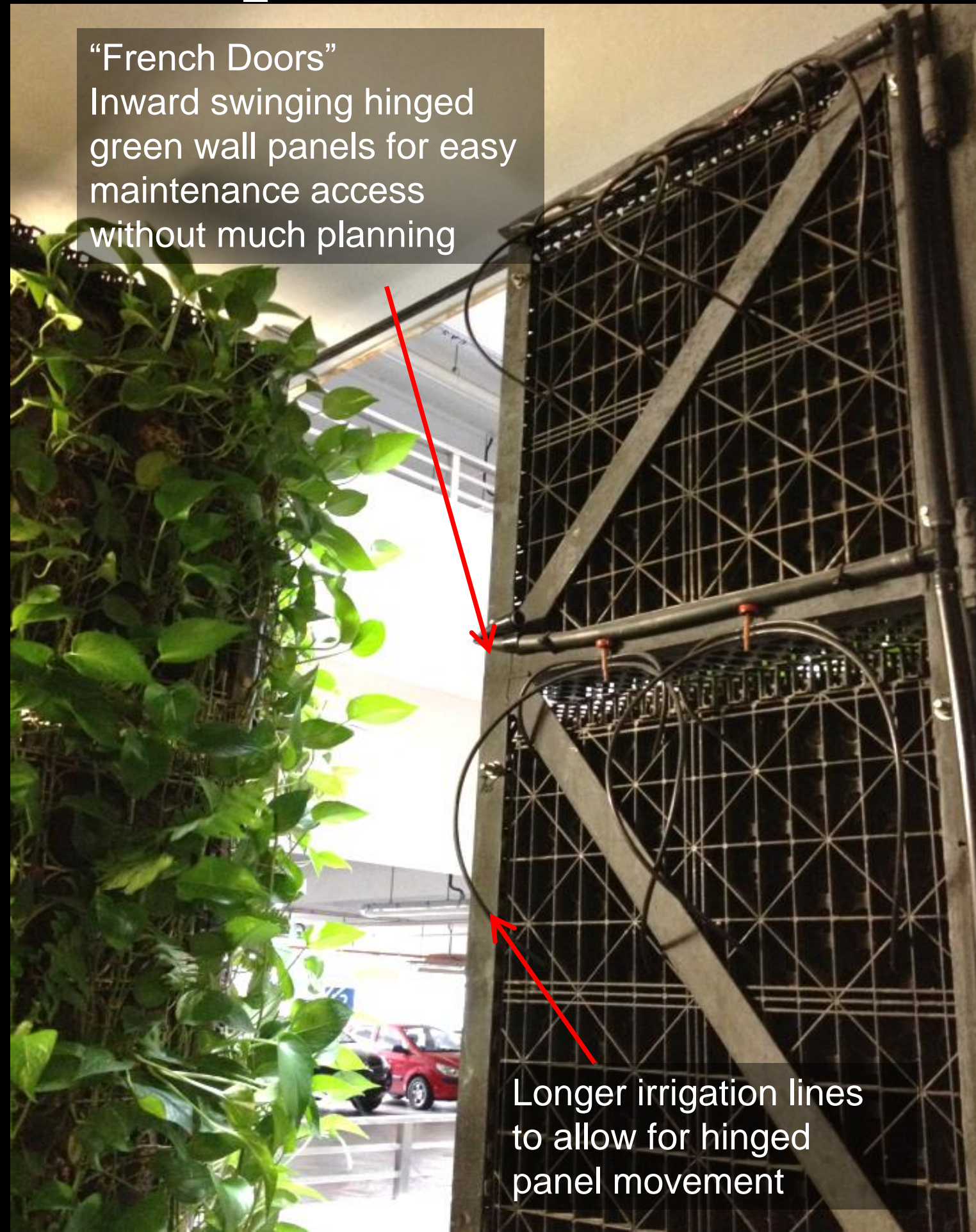
camouflaged guardrail aesthetically pleasing and is a passive safety control

maintenance service corridor behind the green wall.



# Design considerations\_ Back Access Maintainance Good DFS Practices

“French Doors”  
Inward swinging hinged  
green wall panels for easy  
maintenance access  
without much planning



Longer irrigation lines  
to allow for hinged  
panel movement



photo courtesy of DPG









‘Rainforest Rhapsody’ BY Patrick Blanc,  
an interior green wall at lobby of CAPITALAND  
186 sq.m, 10m (H) x 18m (W)



Courtesy of CUGE



Dulwich College Green Wall by Greenology (Singapore)  
240sq.m, 6m (H) x 40m (W)

Courtesy of Landscape Architect: DP Green



## Make passive design considerations for MEWP access

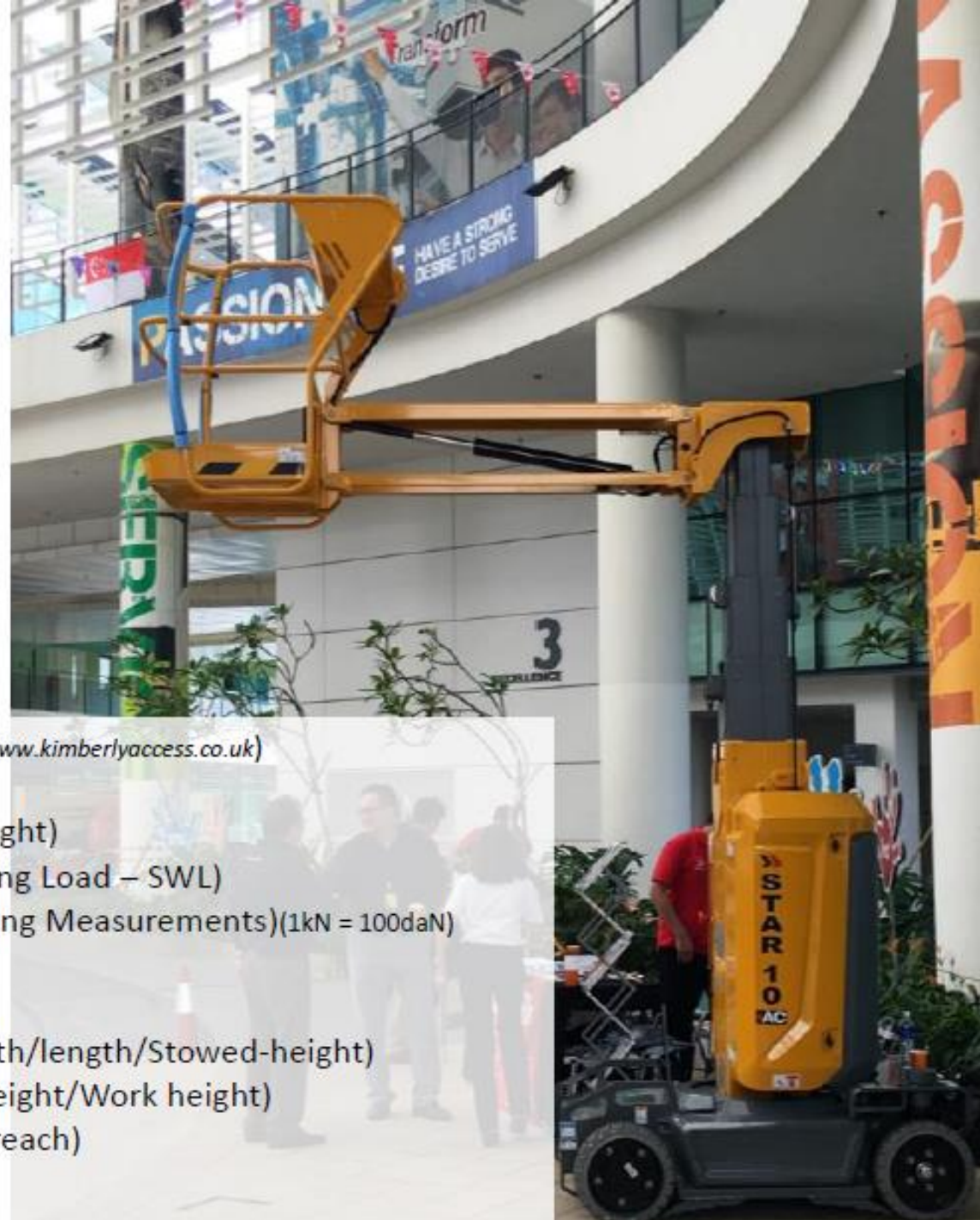
Example (below):- (source: www.genielift.com)

**Loads:**

- 10,206 kg (Vehicle weight)
- 227 kg (Safe Working Load – SWL)
- 1841 kg/m<sup>2</sup> (Occupied Pressure)

**Dimensions:**

- 2.5m / 11.3m / 3m (Closed-width/length/Stowed-height)
- 23.8m / 25.8m (Platform height/Work height)
- 18.3m (horizontal reach)



Example (on the right):- (source: www.kimberlyaccess.co.uk)

**Loads:**

- 2,440 kg (Vehicle weight)
- 230 kg (Safe Working Load – SWL)
- 18.1 daN/cm<sup>2</sup> (Point Loading Measurements)(1kN = 100daN)

**Dimensions:**

- 1m / 2.6m / 2m (Closed-width/length/Stowed-height)
- 8m / 10m (Platform height/Work height)
- 3.1m (horizontal reach)



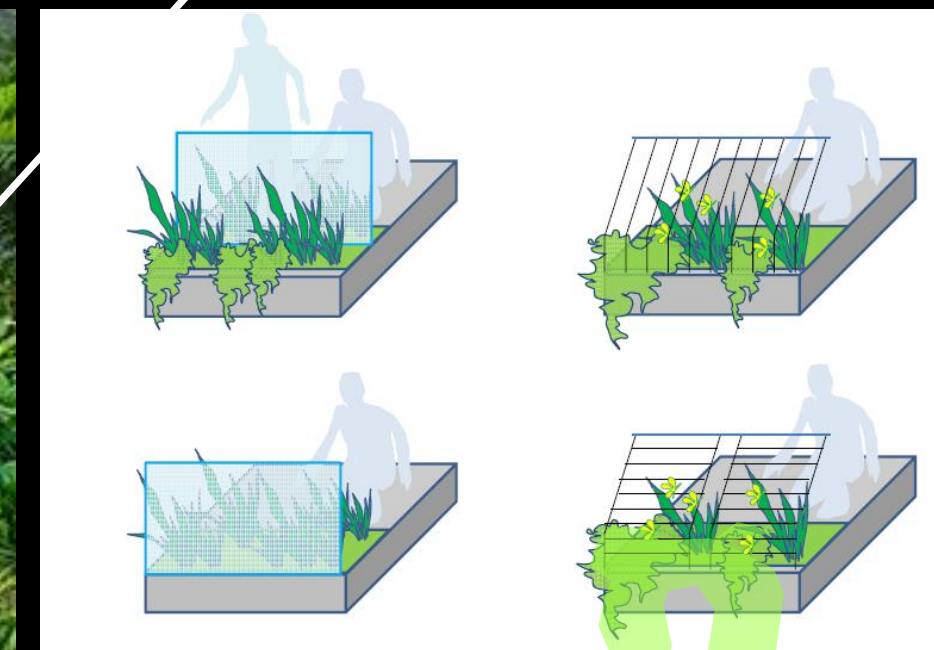
Landing surface that is not level and stable are challenging for lifting equipment to be effectively deployed.



# Considerations when designing vertical greenery systems



Service walkway and access allows for easy maintenance of top edge of planting



CS E11:2014, Guidelines on Design for Safety of Skyrise Greenery





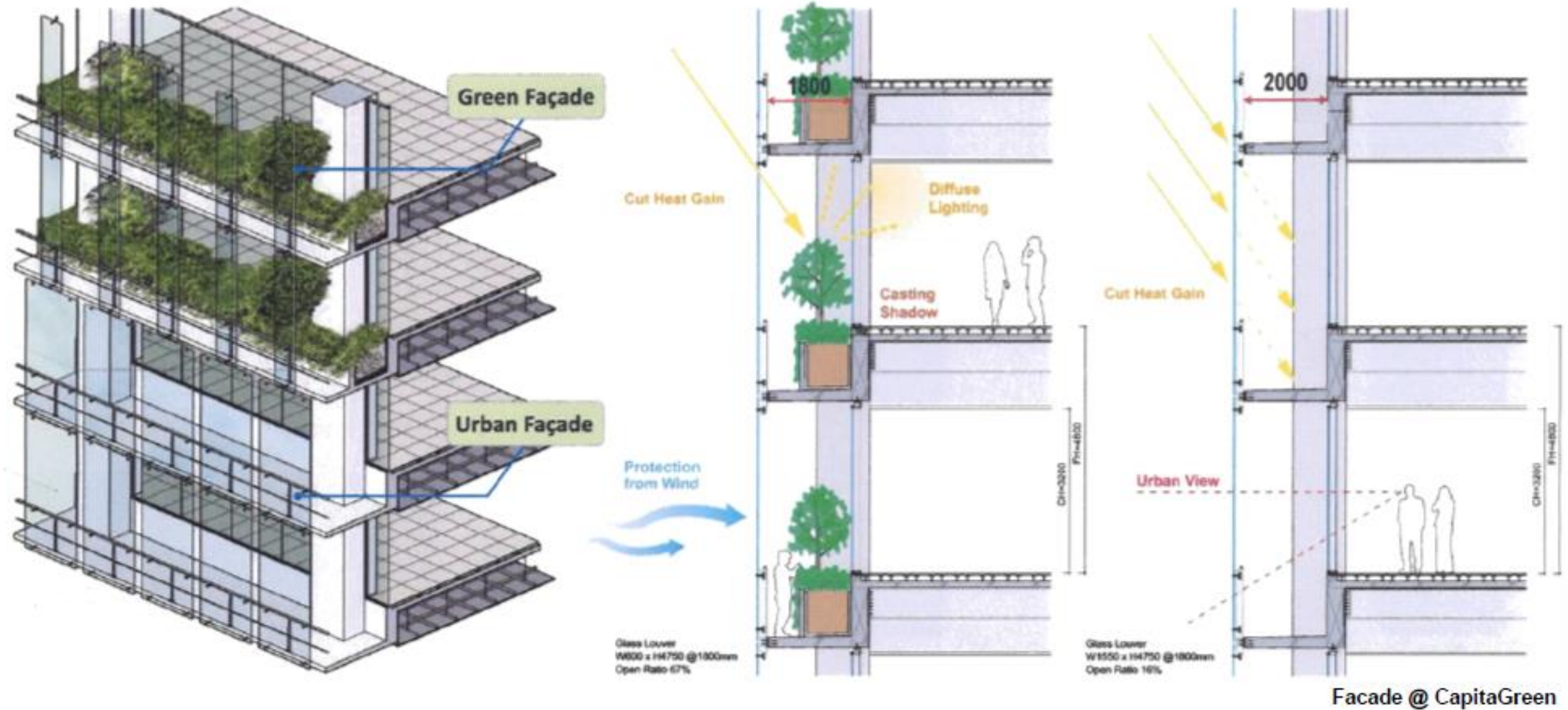
Courtesy of STX





## DOUBLE-SKIN FACADE

Green and Urban Façade (55% Overall Green Façade Ratio)









An overview of  
how Singapore  
promotes vertical  
greening, and  
where we are  
today

Encouraging  
private building  
owners to  
embrace green  
walls

Lessons  
learned

keeping a green  
wall alive and  
maintaining it  
affordably





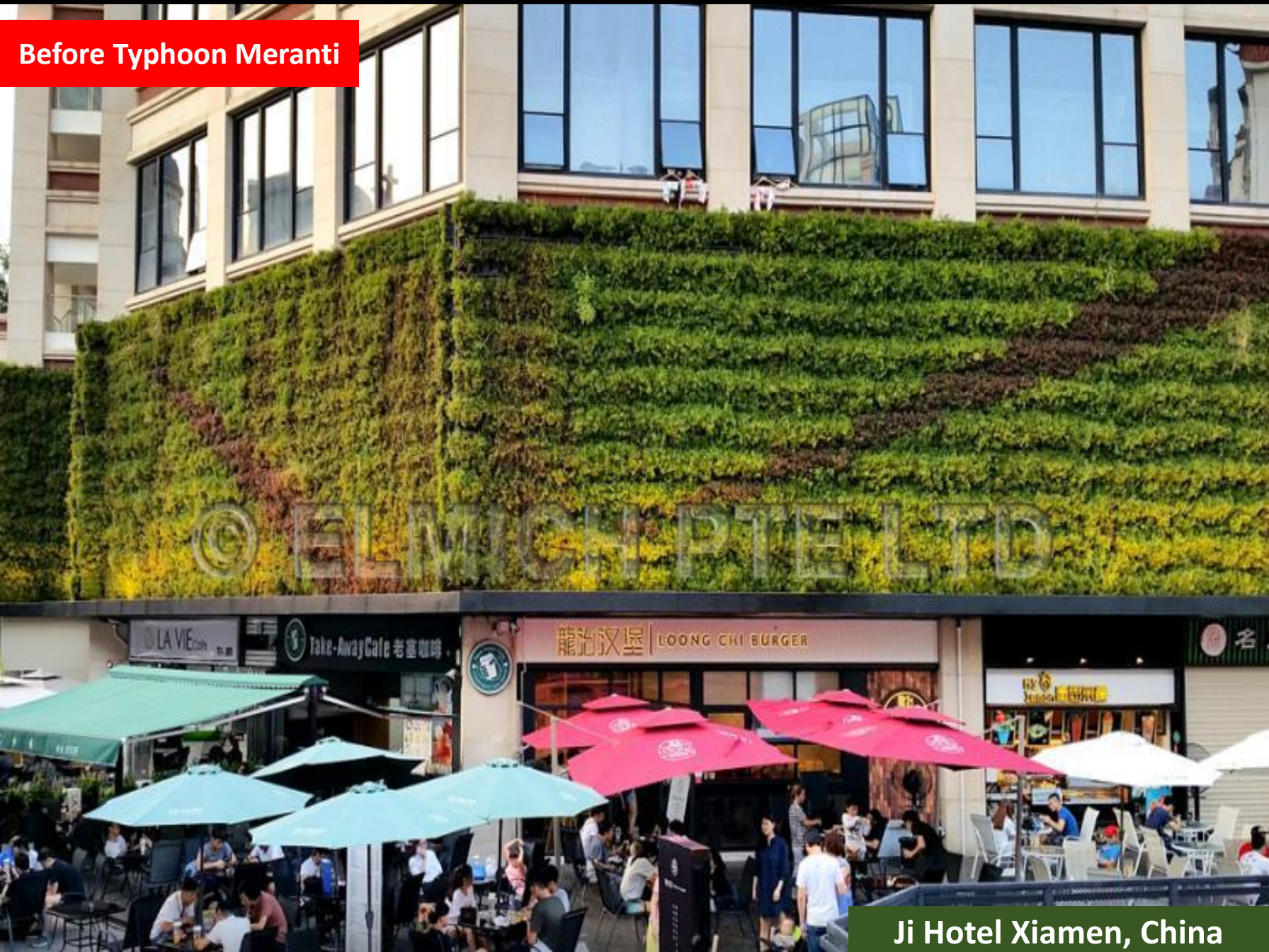


# Lessons Learned\_Strong Winds



Courtesy of Nature Landscape







# Design considerations\_ suitable vegetation

*Identifying and selecting suitable species;  
using inherent growth characteristics and plant needs to meet design needs*

*avoid using poisonous/ thorny plants near activity areas or using only at rear area*

| Work-Scope                             | Remedial Actions<br>(to reduce maintenance complexity)   |
|--|--|
| Plant Replacement                      | <ul style="list-style-type: none"><li>• Choose hardy plants</li><li>• Choose plants appropriate to the site’s microclimate</li><li>• Choose plants appropriate to Owner’s expectations</li></ul>   |
| Pruning and weeding                    | <ul style="list-style-type: none"><li>• Choose reliable substrate source (weedless)</li><li>• Choose plants with appropriate rate of growth (to Owner’s expectation)</li></ul>   |
| Irrigation/drainage system repair work | <ul style="list-style-type: none"><li>• Choose efficient/passive systems, with low maintenance needs</li></ul>   |
| Fertilizing                            | <ul style="list-style-type: none"><li>• Choose reliable fertigation system (Note that Green Roof - fertilizing for green roof, if any, is often done via liquid fertilizer fed through the irrigation system) Fertilizing can also be done manually during periodic maintenance.</li></ul> |

<http://www10.hdb.gov.sg/eBook/landscapeguide/main.html>



CONNEXION MIXED DEVELOPMENT Courtesy of DP Green





*Tristellateia australis*, climber habit  
(after 3 years growth)



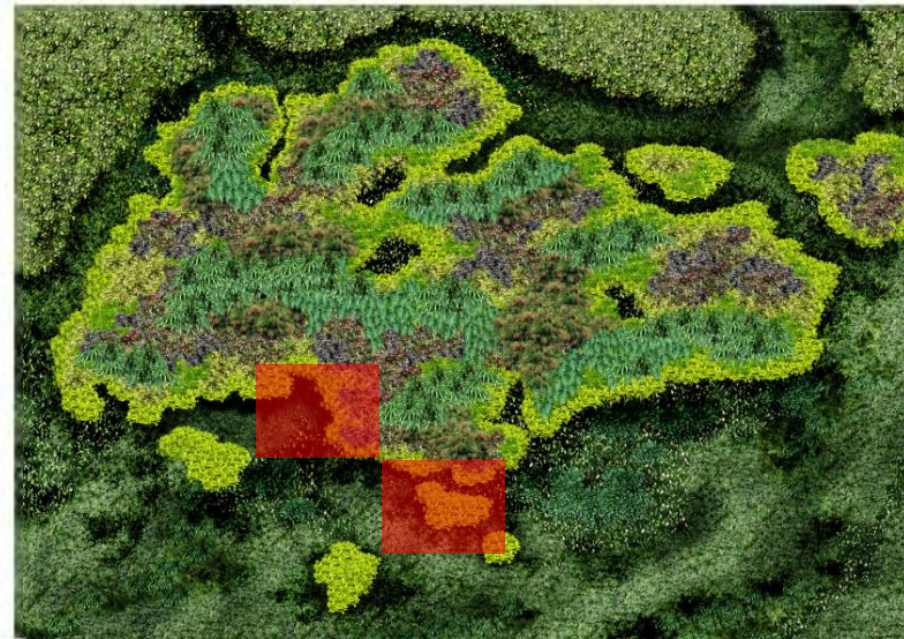
*Phyllanthus cochinchinensis*, trailing habit  
(after 3 years growth)



## GREEN WALL MOCK UP

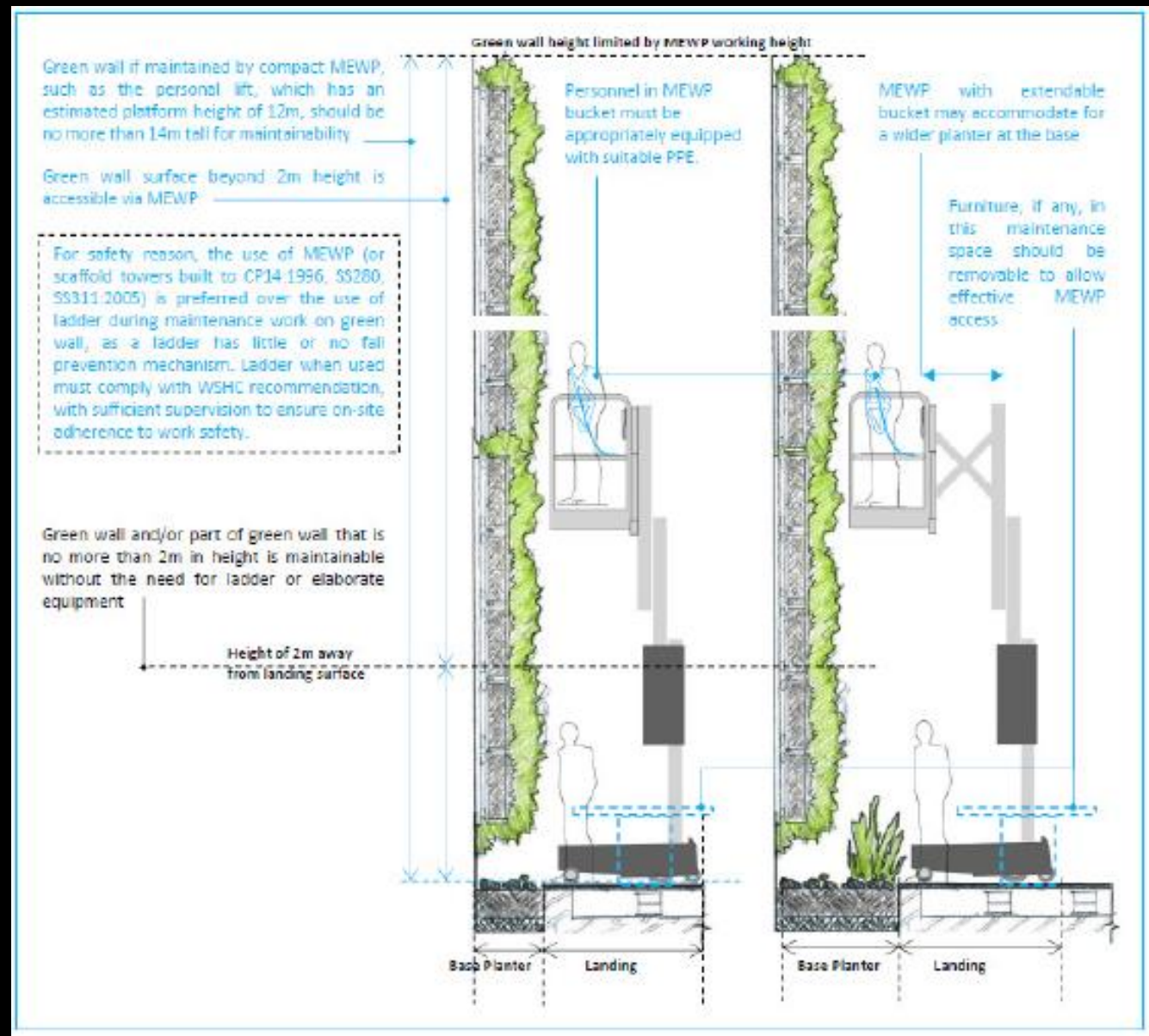
### SINGAPORE MAP SECTION

- IDENTIFYING SUITABLE PLANTS AND PLANTING REQUIREMENTS
- DESIGN IMPROVEMENT





# Lessons Learned\_ design in the access for maintenance



CS E11:2014 Guidelines on Design for Safety of Skyrise Greenery

- Designated area for personal lift maintenance access
- Careful selection of the right MEWP equipment



service landing designed to accommodate 10m H scissor lift







(After Defects Liability Period)



Images from Nature Landscape  
(Maintenance Contractor)



(after 3 years growth)







# Lessons Learned\_ preventing loss of media/ media compaction or refreshing over time



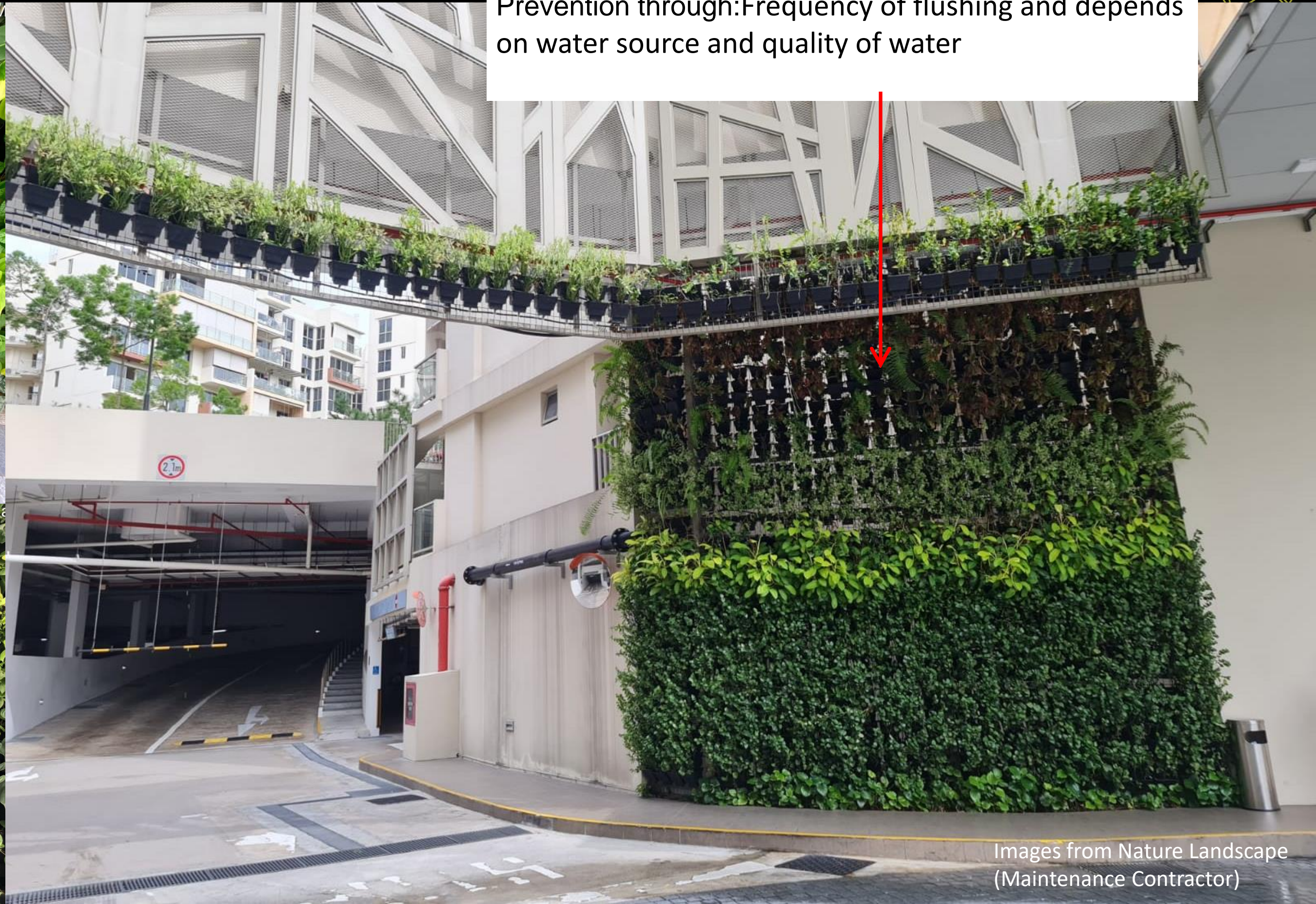
Net method, mostly lost of media and choice of plant. Pilea not ideal.  
Source: Nature Landscape





# Lessons Learned\_ irrigation chokage

Cause: VGP irrigation choked problem, easy to repair  
Prevention through: Frequency of flushing and depends on water source and quality of water



Images from Nature Landscape  
(Maintenance Contractor)



## Lessons Learned\_ Using technology to reduce maintenance time and cost

5-storey high vertical garden spanning 300m across the changi airport terminal 3 (length of three football fields) took 10 months to overhaul and was completed in Jan 2018



*The new Green Wall's (left) potted plant tapestry system with 113,000 plants supports almost 4x the number of plants compared to the original Green Wall (right)*



Despite this increase in quantity of plants, the time needed to maintain the plants has been **cut by over 50%** with wall's new-and-improved system of arranging the plants, and how they are watered and fertilised.



# *lessons learned*

- Integrating it as early in the design process (structural, drainage , accessibility and design for safety)
- it should not just be greenwashing
- knowing what systems will work where as its not one-system fits all..
- buy-in from stakeholders downstream
- Is the maintainability and access for it right?



# UN SUSTAINABILITY DEVELOPMENT GOALS

*the*  
**PHYSICAL  
+ SOCIAL  
+ CULTURE**  
*influences*  
**LIVEABILITY**

**1** NO  
POVERTY



**2** ZERO  
HUNGER



**3** GOOD HEALTH  
AND WELL-BEING



**4** QUALITY  
EDUCATION



**5** GENDER  
EQUALITY



**6** CLEAN WATER  
AND SANITATION



**7** AFFORDABLE AND  
CLEAN ENERGY



**8** DECENT WORK AND  
ECONOMIC GROWTH



**11** SUSTAINABLE CITIES  
AND COMMUNITIES



**12** RESPONSIBLE  
CONSUMPTION  
AND PRODUCTION



**13** CLIMATE  
ACTION



**14** LIFE  
BELOW WATER



**15** LIFE ON  
LAND



**16** PEACE  
AND JUSTICE  
STRONG  
INSTITUTIONS



**17** PARTNERSHIPS  
FOR THE GOALS



  
**SUSTAINABLE  
DEVELOPMENT  
GOALS**



# Designing Liveability through people centric and biophilic approach

*high stress  
lifestyle  
environs*

*living in  
dense city  
neighborhoods  
without close  
access to  
community & green  
spaces*

*people  
working long days  
in window-less  
environs*

*for children in  
city schools*

*Living longer,  
Aging well*

*those in  
institutional  
settings such  
as hospitals +  
nursing homes*



*the role that landscape spaces and nature plays  
In Community Liveability and Health Empowering Environs  
are increasingly important....*





Thank you  
Have a great day!

[Yvonnetan@dpg.com.sg](mailto:Yvonnetan@dpg.com.sg)